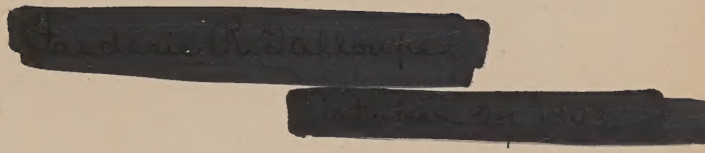
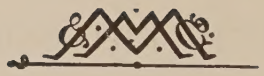


GENETIC PHILOSOPHY



GENETIC PHILOSOPHY

BY

DAVID JAYNE HILL

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TO

THE MEMORY OF MY DEAR MOTHER

Catharine J. Packer

TO WHOM ALL TRUTH WAS EVER SACRED

THIS VOLUME

IS LOVINGLY DEDICATED

PREFACE.

I AM indebted to the publishers of *The Philosophical Review* and *The Popular Science Monthly* for the kind permission to reprint two articles which first appeared in those periodicals and now, with only slight changes, constitute the third and seventh chapters of this book.

D. J. H.

ROCHESTER, NEW YORK,
September, 1893.

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GENETIC PHILOSOPHY.

INTRODUCTION.

THE GENETIC METHOD.

Rousseau, the champion of naturalism, has said, that "the condition of him who reflects is an anti-natural condition, and the man given to reflection is a depraved animal."[1] Regarded merely as an animal, a reflecting being may be depraved, but this depravity may not be incompatible with pre-eminence in another order of creatures, in which the animal nature is subordinated to intelligence. The thinker may be, by virtue of his thought, less perfect as an animal, but Rousseau could not deny that it is man's thought which determines his rank in the scale of being. And, whether we prefer the sensuous complacency of the purely animal condition or the "anti-natural" state of conscious reflection, the fact remains that, in the process of development, Nature rises from inorganic elements to organic life, and,

[1] J. J. Rousseau, *Discours sur l'Origine et Fondements de l'Inégalite des Hommes*, 1758.

continuing her course of transformation, passes on through successive stages of animal forms until she arrives at man, self-conscious and meditative, possibly a deteriorated animal but actually an expanded intellect. The philosopher, therefore, is a natural product; and if reflection is anti-natural, it is so only in the lowest stages.

The Protest against Philosophy.

To philosophise is, then, characteristically human, and an attempt to perform this distinctive function of humanity needs no apology. And yet there is a general protest against philosophy. Perhaps it is, in part, the native opposition of the animal to what requires of him that "anti-natural" task, reflection. Thus regarded, the sneer at philosophy is a vulgar disrespect to superiors, which may be quietly ignored. But the protest against philosophy is not merely a recalcitrant feeling toward reflection, expressing itself in contempt for thought and the thoughtful. It is, in part, also the reaction of balanced minds against visionaries and sciolists, the verdict of the sound human understanding against the vice of systematic dreaming. In truth, philosophy, as a distinct discipline, has fallen into disrepute because its representatives have regarded reflection as a source of truth rather than a process of discovery. It has come to be

regarded by seekers after truth as an attempt to create wheat by threshing old straw. The novice in philosophy has been expected to divest himself of all confidence in his senses, as generators of illusion, and to surrender himself to the guidance of pure logic. Thus only, it is said, by following the Ariadne's thread of some intuitive principle, can one hope to be conducted through the mazes of abstract ideas out of the labyrinth of sense-impressions to the upper air of immutable truth. All the intimations of plain common-sense are to be repented of as intellectual sins, or at least as indiscretions of youth unworthy of a sophisticated man, and all appeal to external observation must be foresworn as apostasy from pure reason. Inductive inference is proscribed as the sin of Lot's wife, and homage to particular facts is prohibited as infidelity to general principles and, therefore, sheer idolatry.

Philosophies have thus degenerated into mere intellectual cults, and philosophers attach themselves to schools and wear the phylacteries of sects. They all require preliminary lustrations and purifying fasts as a preparation for discipleship. Not to belong to a school, is to bear the obloquy of being a vagabond in the world of philosophy; unless, indeed, one founds a school of his own at least as large as a Comtean society, which is said to consist of "three persons

and no God." Hegel, who said that only one man in Europe understood him, and he misunderstood him, attained an overshadowing pre-eminence not because he was comprehended, but because it was the fashion to follow his leadership, and his "secret" became as fascinating as that of Nature herself. The "veiled prophet" is an impressive figure in the history of philosophy, the sure attraction to countless "understudies" who aspire to greatness as expositors and commentators. In this category a large number who would blush to confess antipathy to thought as such, as the bolder scoffers do, nevertheless combat it by a reverential deference for the *ipse dixit* of their masters. Thus Kantians and Herbartians profess to believe that their great teachers found the absolute terminus of the philosophic road, and with a Mohammedan zeal maintain that to come up with them in the journey is the highest remaining distinction.

Contrast for a moment this reverence for *a priori* principles and this personal loyalty of discipleship, which are characteristic of what is called "philosophy," with that consensus of verified results recognised as "science," from which the personal element is almost eliminated, — and it is easy to understand why scientific workers have distrusted philosophy and think of it as little more respectable than theosophy. The social, co-operative, and exact habits

of the scientific investigator are all opposed to the individual, esoteric, and speculative traits of the professional philosopher. The system-maker attains unity in his thought not by deriving it, but by imparting it. Philosophy uses assumptions as the permanent materials of its construction; science uses them only as the temporary scaffolding of its edifice. Philosophy begins with causes and proceeds to the demonstration of their effects; science begins with effects and seeks to trace out their causes. Philosophy attempts to generate reality from ideas; science aims to conform ideas to reality.

Schools of thought are frequently dominated by the hallucinations of great men. Their fixed ideas are mistaken for solar centres. The history of thought everywhere illustrates this, and biography often explains it. The philosopher is closely akin to the poet. The former employs the logic of thought where the latter follows the logic of feeling. The one strives to satisfy the standards of reason, the other the standards of taste. Hence the philosopher deals with abstractions under the law of thought, the poet with imagery under the law of sensibility. But both are essentially "makers," rather than discoverers, who place their personal stamp on their productions. They do not reflect the universe; they transform it. The man of science,

on the contrary, directs his instrument of precision toward the world of reality, opens his eyes, and awaits his vision. Having received it, he rectifies and completes his preperception and prepares himself to ask another question. For him the only "*philosophia ultima*" is the final sense of reality reserved for the last of his race, who shall have assimilated its acquisitions and unified its knowledge in a harmonious totality.

The Rehabilitation of Philosophy.

It is the method of philosophy, therefore, and not its aim, which the scientific worker repudiates. The unity of the universe and the harmony of all truth are for him also essential postulates of investigation. They are conditions not only of rational research, but of the very conception of truth itself. His distrust of philosophy resolves itself into his strong sense of human immaturity in matters of knowledge and of the hopeless defect of all *a priori* methods. He refuses to believe that an individual mind, ignorant of the simplest facts concerning its own bodily investiture, can, by mere reflection, solve the riddle of the universe. He therefore prefers to labour on in company with the multitude of his fellow-workers, accumulating facts and placing small sections of them in intelligible relations, and to

forego that pleasing sentiment of satisfied comprehension which he prudently regards as an obstructive form of self-deception. And yet the hope that more light will be thrown upon the unsolved problems is really the impelling motive of all his toil and patience. He may not be willing to call this desired solution of the problems of nature by the name of "philosophy," but equally with the philosopher he is striving for this goal. The final unification of knowledge is for him, as it must be for all rational minds, the end of all discovery.

By what method, then, may we dare to hope that this common object of both science and philosophy may be accomplished? Certainly not by individual guesses at the truth, or by attempts to deduce the variety of the world from a single principle. This is the procedure of philosophy in its pre-scientific, or purely speculative stage. Like much of political history, the history of such speculation is chiefly valuable in teaching us what to avoid. It is the record of unsuccessful experiments. But there is obviously a work, left undone by the various sciences, which is essential to a complete appreciation of their results. Each of these sciences presents its report, in its best accredited text-books, of results attained, but no one of them is charged with the duty of collating and interpreting these reports.

May we not be able by examining larger aggregates of facts than those dealt with by the special sciences themselves to arrive at a deeper insight than any one of them affords, and thus to unify a wider area of knowledge, or at least indicate the direction in which we are to look for such unification? Such a synthesis would not, indeed, be final, but it might serve as an epitome of accepted results and as an indication of the progress already made. And how otherwise can we expect to exhibit and emphasise those lacunæ in knowledge and those still unanswered questions to which, in the interest of the scientific movement as a whole, special attention should be directed? There appears, then, to be an opportunity for the rehabilitation of philosophy by its newly attempting this task, — which is, in truth, its historic and peculiar task, — but which it has hitherto not satisfactorily performed, because it has assumed the arrogance of a final and self-sufficient teacher when it should have taken the humble place of a learner. Such a renovated philosophy need not date its credentials from the time of Plato and Aristotle, nor even begin its advance by a preliminary retreat "back to Kant," in order to inspire confidence. Its answer to any challenging *quo warranto* will be an appeal to the accumulation of verified human knowledge sustained by the consensus of the whole re-

public of science, and the splendid triumphs of organised investigation.

The Genetic Method.

And, now, what is that method which has transmuted astrology into astronomy and alchemy into chemistry, which has won for itself the right to be called "scientific" because its adoption has everywhere been signalised by the advance of science? It is an order of procedure which may be described briefly as follows: —

(1) It starts with the assumption that truth is to be *discovered*, not *made;* and that we are to discover it at the *end*, not at the *beginning*, of our examination. Philosophy has not proceeded upon this assumption, but beginning with certain "principles" which have seemed true, it has assumed that truth could be evolved from or tested by them. Even Herbert Spencer, for whose philosophy a specially scientific character is claimed, and who certainly does not ignore the testimony of the sciences, presents as the portal to his vast system of "Synthetic Philosophy" a large volume of "First Principles," attacking at the very outset the problem of the "Unknowable." This *a priori* determination of what is knowable and what is not, is diametrically opposed to the procedure of science, which discovers what is knowable but

does not prescribe it. It is the peculiarity of philosophy thus to invert the order of inquiry, professing to find the limits of knowledge first and its contents afterwards. And when it is considered that ignorance is less a matter of scientific agreement than it is of varying grades of intelligence, we realise that it is a reversion to the worst estate of philosophy thus to separate itself from general consensus and to assume the tone of dogma and prescription. Nor can science be accused of adopting an *a priori* principle in assuming that knowledge is at the end, not at the beginning, of its inquiry; for this is simply the statement of the fact that we do not know, not the enunciation of a principle determining our knowledge.

(2) The positive work of science begins by seeking a *real, as distinguished from an ideal, order of phenomena, through direct observation.* It points its telescope toward the sky and looks to see what is visible, recording and comparing observations until its judgments have a certain predictive value, and does not, like the Italian philosopher, Cremonini, refuse to look through the telescope for fear of upsetting preconceived theories. But in starting from an objective basis, it does not assume any theory of knowledge, or construct any final hypothesis concerning the nature of objects. It adopts no principle whatever, but simply credits an indisputable fact; namely, that we see with our eyes, and that things seen are to us objects.

(3) A real order of phenomena being thus arrived at, the *law of recurrence* of these phenomena is next observed. Here, again, no principle is assumed, but a new fact is apprehended, for every natural law is simply a universal fact stated generally. The law of gravitation, for example, is merely the universal fact that every portion of the earth, or of any other planet or star, is attracted by every other portion inversely as the square of the distance.

(4) A law of recurrence being established, *the real order is found to be capable of an ideal extension in time and space;* for the real order, known as actual, within limits, excludes every contradictory order, under like conditions. Thus a consistent picture of the world is formed, which may be far from complete, but still serves as an outline to be filled in and completed, although it extends beyond the sphere of sense-perception both of individual men and of all men. Geology places most of its facts in a portion of time when no human being lived, but not the less confidently because no human eye ever beheld the actual writing of the geological record. Astronomy places the heavenly bodies in spaces no human foot has ever traversed, and not only measures and weighs, but determines the chemical constitution of these bodies, with as little hesitation as in treating the diagrams on a blackboard or the small pieces of

matter in a chemist's laboratory. A law of recurrence being once in the field, every other law of recurrence contradictory to it, under like conditions, is displaced.

(5) Every state of reality is thus regarded by science as the *reappearance of a previous state of reality, under changed conditions.* There is no room in the universe, according to science, for an effect without a cause, for a consequent without an antecedent, for a state of reality not related to a prior state of reality. Transformation occurs, but nothing creates itself. All the great generalisations of science are reaffirmations of this, such as the principle of continuity, the uniformity of nature, the persistence of force, and the indestructibility of matter. It is, however, the *last* word of science, not its *first* word. It is the omnipresent truth disclosed by every observation and experiment. It is the one universal that binds together all phenomena and gives unity and coherence to all knowledge.

(6) Following everywhere this thread, and proceeding nowhere without it, the method of science is the *genetic method.* Things are discovered to be aspects of a process, or of processes so interrelated as to be in their totality a complex process. Knowledge is completed only when objects are apprehended not merely as aspects of *being*, but also as phases of

becoming, as *momenta* of being. *What* "being" is, science never answers except descriptively. It is, perhaps, vain to inquire; for every new answer must be some new appositive of the old question, the repetition of an identical proposition. "Being *is* this," can only signify, "Being *being* this," which is, "*This* being." It is all summed up in saying, "Being is what we find it to be." But it is idle to define "being" by some one of its aspects. Therefore, the problem of science is never ontological, but descriptive. Ontology presents no legitimate problem. Granted faculties with absolutely no limitations, the investigation of being displays it only as being, revealing a richer content until its full content is exposed; but there can be no problem in this last vision, and yet the mind is still confronted with being. Ontology is as little a problem for philosophy as it is for science, for there is no real problem. The inquiry after what *is*, does not penetrate beyond being, as if it were the mere approach to some deeper secret. What we seek is to know the phases of being and to unify them by discovering a continuity among phenomena which shall render them one to intelligence as they are one in reality. For, if they are not really one, if they are really disjoined, unrelated, discontinuous, separate beings, then they baffle all investigation, having no intrinsic rationality, and,

therefore, are as likely to appear in one way as another. There is, in that case, no ground of inference. Anything may be connected with anything else and any event may either precede or follow any other event. But science has shown the opposite of this to be true. It has been shown by the genetic method, unifying the aspects of being by tracing them through their various phases of change.

And, now, if we wish to define this genetic method, it may be stated thus: Being, as apprehended by our intelligence, is found to possess continuity, and all facts are the aspects of a process. When, therefore, facts are translated into thought, they must not be sundered and isolated, floated off from their attachments and treated as independent entities. The continuity which connects them as real must also connect them as ideal. In other words, they must be genetically regarded, or considered as aspects of a continuous process to which they must be referred. *The genetic method, then, consists in referring every fact to its place in the series to which it belongs.* An alleged fact is entirely meaningless until it is restored to its serial relation. When thus restored, it is seen to be a part of the real order, the outgrowth of its own antecedents, and it is thus unified with other facts as part of a continuous whole.

To illustrate this by an example: an archæolo-

gist finds a bronze axe in a heap of shells. The fact that this object is here is not a disconnected fact. To trace it genetically means to follow it to its origin in the real series in which it belongs. No line of witnesses is necessary to prove that it was made by a man, represents a certain period of culture, and came to be placed where it was found by one of several possible agencies. Further consideration may determine the whole series to which it belongs, or it may stop short and fail to effect this, but as soon as we lose the thread of genetic reference, all scientific thought stops short and all other thought is nugatory.

Again, to use another illustration, a chemist discovers a sodium spectrum in his spectroscope, in which there is a ray of solar light. In the spirit of Doctor Faustus he might refer this to the presence of an imp in the spectroscope devising this appearance to puzzle him. But if he rests here, he does not employ the genetic method. If, indeed, he had demonstrated that such imps actually exist and that they divert themselves by creating illusions in instruments of investigation, he would be quite justified in stopping here, for he would in that case have employed the genetic method as far as it is available. But it is easy to see that there could be no science; for the next instant, under the same conditions, and

without any other reason than the wish to cut a new caper, this invisible imp might throw in the spectrum of some other element. But the chemist differs from the early alchemist in regarding this hypothesis of the imp as a mere efflorescence of fancy, and proceeds to refer this fact that he sees the spectrum of sodium to the presence of that mineral in the sun. The fact is thus unified with the body of previously verified knowledge. Thus, to science, there is no isolated phenomenon. The unscientific mind and the non-scientific mind treat phenomena as if they were isolated, or first isolate them in thought and then place them in an artificial series. Such an artificial series, once formed, may be perfectly logical and yet totally false, for logic simply requires consistency, not reality.

If the genetic method could be so applied as to restore every fact to its serial relation in the real order, the work of science and of philosophy would be completed. Still, the power to raise further questions might not be exhausted, and it would be possible for intellectual perversity to ask why the order thus determined should be accepted rather than some other conceivable order. To this there is only one answer. There is a real order of phenomena and truth is the correspondence of our thought to this actual order. If any one is so perverse as to inquire

why truth is truth, and why falsehood will not answer as well, his case is simply hopeless and he should be left to the consequences of his own imbecility, so far as discussion is concerned. He will have for companions those who are anxious to know why "being" is "being" rather than "nonentity," and what "existed" before anything "was," and the relation of the "knowable" to the "incomprehensible"! Such inquirers are evidently not looking for truth, but for mystery.

The Systems of Hegel and Spencer.

Two philosophic systems — both the products of our century, and playing by far the most prominent *rôle* of any in the last half of it, dividing between themselves the majority of the speculative intellects of our time affiliated with any of the historic philosophies — closely approach, without actually attaining, the genetic method which science employs. They are the Absolute Idealism of Hegel and the Synthetic Philosophy of Herbert Spencer. Both systems are pervaded by the dominant idea of evolution, the German system seeking to realise this in terms of thought by a reconstruction of logic, and the English embodying the conception in the transmutations of persistent force. The German philosopher, with little dependence upon the results of the empirical sciences,

has been the more successful in satisfying the requirements of art, morality, and religion; while the English philosopher, offering to these a less elevated exposition, has brought his system into closer touch with the cosmic sciences. Each has established a school which has proved attractive to different types of disciples, but neither has succeeded in convincing the world of thoughtful men that his is the ultimate philosophy. Neither has employed the genetic method, without the embarrassment of *a priori* propositions, and both have erected vast fabrics of abstract ideas, each by a method peculiar to himself.

Absolute Idealism.

Hegel, who was born in a fog of transcendental speculations, a student, as his teachers said, "of fair ability, good character, and a passable knowledge of theology and philology," but with no attainments in philosophy while at the university, became a professor at Jena, and was finally called to Berlin, where he attracted the attention of the philosophical world by the boldness and originality of his teaching. In his early years he was apparently much dazed by the problems of thought and was something of an illuminationist. But approaching philosophy as a business, he cast about, after the fashion of his time, for a fundamental principle. Those of Fichte and

Schelling, who with himself were called by Schopenhauer "the triumvirate of sophists," seemed to him unsatisfactory. In the language of Professor Burt, he approached the subject in this manner: "Required a principle possessing objectivity, universality, self-determination, its construction must be, as it were, a self-construction." [1] This principle Hegel finds in "thought," which may be defined, as treated by him, as "the activity of spirit in its independent, identical simplicity, which draws its distinctions from itself, and places them in itself, — whereby they have the character of self-equality and universality"! Thus equipped with a principle, he proceeds to formulate his *Logic* — which is the organon of the whole system.

It is difficult to do justice to Hegel, for even his closest students and most ardent admirers have disagreed widely as to what he really intended to teach. That canny Scotchman, J. Hutchison Sterling, has devoted two bulky octavo volumes to the exposition of the *Secret of Hegel* and, even after this elaborate effort, it remains to many of his readers a secret still. It cannot be expected of us, therefore, to give great lucidity to doctrines so essentially recondite; but, so far as his method is concerned, it may be summarised thus: When by its self-movement

[1] B. C. Burt, *A History of Modern Philosophy*, vol. ii, p. 91.

thought has determined itself as pure thought, it turns to the problem of evolving itself so as to display its organic constituents. Thus it passes from the sphere of pure logic into that of metaphysics, since thought and being are one. But being, without any characteristic or determination, is nothing. And yet the thought which mediates between being and nothing cannot be nothing, for it is a discrimination. The truth of being and nothing is, therefore, found in their synthesis, the thought which mediates them. Thus the union of opposites, both of which in isolation are negations, gives reality. But such reality is essentially simply a "becoming," which is a concrete notion, a one in a many. Quality and quantity, and all the other categories of being, are then evolved by this immanent dialectic in the process of thought. Thus the only reality is thought itself, which by its own independent activity generates all knowledge, objective as well as subjective, and literally creates the universe. Beyond thought, or as a concomitant of thought, there is absolutely nothing.

This is, perhaps, a sufficiently ample statement of the purely subjective logic by which Hegel proceeds in his evolution of ideas. He exemplifies the old-fashioned journey of exploration in search of a principle, in this case a "self-construction," which is simply his own thought, "drawing its distinctions

from itself and placing them in itself." It is merely a repetition of the old process of the philosophic spider weaving its web from the depths of self-consciousness and calling it the universe. There is nothing really genetic in it, except that thought is born of thought in endless generation. It is a revival of the ancient philosophic illusion that reflection itself is a source of truth.

The Synthetic Philosophy.

But certainly we shall not find the hard English sense of Herbert Spencer indulging in such purely subjective diversions. Trained as a civil engineer, early brought into contact with external things, and required to deal with them for utilitarian purposes, he must have discovered the "native depravity of inanimate things" clearly enough to fill him with a conviction of their existence apart from his own thought about them. In truth, his sense of a reality, not entirely penetrable by human consciousness, is manifest in the metaphysical dualism with which he confronts his readers in the first chapter of his *First Principles*, dividing the universe into two sections, the "Unknowable" and the "Knowable." After introducing us to this nondescript noumenon, which we are constantly running into in the dark, but whose nature can never be brought even for

a moment into the light, he hustles the "Unknowable" out of court as a witness that has excited the imagination of childhood, but deserves no consideration from the minds of adults. The question inevitably arises, Does Mr. Spencer here proceed according to the genetic method? In order to answer satisfactorily, it is necessary to know, first, how he comes to admit the existence of this "Unknowable" at all; and second, how, after admitting it, he justifies its immediate and total expulsion from the area of knowledge.

The grounds on which the "Unknowable" is admitted to exist are "that all our knowledge is relative; that the relative is itself inconceivable, except as related to a real non-relative; that unless a real non-relative or absolute be postulated, the relative itself becomes absolute; and, finally, that the existence of a non-relative is involved in the process of thought. Hence our indestructible belief in that actuality."[1] This is certainly a rather inharmonious company of propositions. All our knowledge is relative, and yet the existence of a real non-relative is involved in the process of thought. Our knowledge of the process of thought, then, discloses a non-relative element. Why, if it is essential to the process of thought, should it be immediately

[1] Herbert Spencer, *First Principles*, pp. 96, 97.

excluded from thought, and not subjected to further analysis? Shall we render all our knowledge "inconceivable," as we are told we shall do, by neglecting the relation to the non-relative? And what, now, is the evidence of the presence of this non-relative, without which the relative itself is inconceivable? This is the answer: "As we can, in successive mental acts, get rid of all particular conditions and replace them by others, but cannot get rid of that undifferentiated substance of consciousness which is conditioned anew in every new thought, there ever remains with us a sense of that which exists persistently and independently of conditions." And what is that "undifferentiated substance of consciousness" which thus persists? It is "being" in its continuity, and the non-relative element in every thought is precisely continuity itself. This is really the evasive spectre that slips so suddenly in and out of Mr. Spencer's propositions, now awakening "indestructible belief in its actuality," and now utterly vanishing from the area of knowledge. But let us name and detain this mysterious "Unknowable." It is *continuity of being*, which is "conditioned anew in every new thought," and is "that which exists persistently and independently of conditions." So far from being the "Unknowable," it is precisely what we do know, and that which certifies to all our

knowledge. In expelling it from his system, Mr. Spencer has not only missed the genetic method, but he has repudiated that which alone can give validity to his synthesis or to any synthesis.

But, although so closely approaching it, the author of the *Synthetic Philosophy* does not profess to employ the genetic method. His method is professedly "synthetic." He looks for the unifying principle of philosophy not in an ever-present truth, the essential continuity of being, but in an ultimate all-inclusive generalisation, to be reached by a synthesis of all lower generalisations. His plan of unification contemplates the preliminary survey of all knowledge, and moves to its consummation through the media of "data," "inductions," "general synthesis," and "special synthesis." He traces the whole course of "integration" and "disintegration," as if seeking completeness by the establishment of an absolute cycle in which everything must be included. It all ends in "dissolution," which is then the first note in the repetition of the same song. The universe is to him like a great music-box which can play but one tune. Following his method, his system must be encyclopædic or it is nothing. And yet he has not guarded against the constant possibility of the invasion and disturbance of the whole scheme by that mysterious "Unknowable" which he can get

along so well without, but against whose unexpected return he has made no provision.

It shows great self-reliance for one man to invade and reorganise every department of science, in order to show that his law of evolution is regnant in them all, but it is a hazardous experiment. There may be newly-discovered facts, not subsumed in any synthesis, pretending to be purely inductive, and its truly deductive origin is more likely than not to appear. To restate and reconstrue the whole body of knowledge is too large an undertaking for one man, and recalls the ambition of the pre-scientific stage of development. The spirit of modern science is opposed to such individualism, and cannot entrust to one mind the epitomising of all known facts. Its tendency is rather social and co-operative, and it looks to experts to report upon their various subdivisions of knowledge.

The genetic method does not aim at a complete individual synthesis. Under its guidance, contemporary philosophy should not attempt the reformulation of all knowledge. Its function is that of an intellectual clearing-house, to borrow a figure from the commercial world. The business of the philosopher is to equate the deposits and indicate the deficits of the special sciences. This is an office which many can perform better than a few, and thus

philosophy as well as science may be made social and co-operative, although it will always remain true that philosophy in the active sense is not every man's business.

The Problems of Philosophy.

The distinctive problems of philosophy arise from the incompatibility of empirical conceptions. That was a happy phrase of Herbart's, when he said that philosophy is the "elaboration of conceptions." This must not be taken in the sense that truth can be manufactured by mere logical processes. But wherever ideas, through ignorance or misconception, are out of their serial order, or severed from their real connections and floated off in mid-air, there is work for the philosopher to do. The genetic method will prove of most value in bringing these "thoughts that wander through eternity" back to their proper moorings. Wherever a task of this kind is to be performed for a large section of humanity, there is a problem of philosophy. And here we are made to feel the full force of Rousseau's idea that "the condition of him who reflects is an anti-natural condition"; for usually the more entangled a man's ideas are, the less he is disposed to use the energy needed to arrive at a clearer understanding. Brought face to face with the deepest questions, Reason is

tempted to renounce its responsibilities and to abandon its claims, preferring to surrender itself to the dominion of accepted dogma rather than vindicate its native powers. To many this appears so clearly the prudent course, that reflection seems not only "anti-natural," but bold and perilous in the highest degree. This, however, is to abandon all vital faith in truth and its intrinsic value, and to fall into a voluntary mysticism. The genetic method seems to open a new way for thought. It remains to be seen whether or not it offers any refuge from mental confusion and contradiction.

I.

THE GENESIS OF MATTER.

UNTIL he begins to philosophise about it, every man believes in the real existence of what is called the "material world," occupying a space extending in every direction beyond the limits of his own body, which nevertheless is regarded as a part of it. This world of matter seems to exist independently of our thought about it, and is clearly apprehended by our senses as real and extended. When, therefore, we learn for the first time that the great German philosopher, Immanuel Kant,[1] teaches that time and space, quantity and quality, cause and relation, are mere forms of intelligence, having no reality outside of the human mind, and that many philosophers, including some now living, have regarded this doctrine as one of the greatest discoveries of all time, we are inclined to resent this teaching as a deep injury to our faith in greatness. If we turn for reinforcement to a

[1] *Kritik der reinen Vernunft.*

modern champion of realism like Herbert Spencer, we find that he also touches matter with philosophical daintiness, and puzzles himself and his readers with cautious reservations regarding its "conceivability."[1] It must be, he affirms, either infinitely divisible or ultimately indivisible, and whichever horn of the dilemma is accepted, intelligence is impaled upon it, for neither infinite divisibility nor ultimate indivisibility is conceivable. His disciple and interpreter, John Fiske,[2] repeats and expounds Mr. Spencer's logical puzzle as a fitting rebuke to intellectual pride. Starting with the supposition that matter consists of "solid atoms never absolutely contiguous to each other," he then affirms that "the particles of these particles cannot be in direct contact." Having set up this mythical atom, which is "solid," but whose "particles cannot be in direct contact," however far they may be subdivided, he invites us to try our hand at making either infinite division or ultimate non-division appear conceivable. Of course we find it difficult to refuse to divide what, by the hypothesis, is *solid*, and equally difficult to succeed in dividing what, by the hypothesis, has *no continuity*. Hence we seem to have come to the limits of thought as regards matter, and to be com-

[1] Herbert Spencer, *First Principles*, pp. 50, 53.

[2] John Fiske, *Outlines of Cosmic Philosophy*, vol. i, pp. 3, 6.

pelled to regard it as "inconceivable." A little reflection, however, shows us that we are here dealing not with a real but a purely ideal atom, with the unfortunate addition of a diametrical contradiction as its most distinctive feature. From such apparent perplexities of realism as this, generated by setting up hypothetical entities which the mind cannot reconcile with its experience, idealism has derived much comfort, and has felicitated itself upon the incomprehensibility of "things in themselves," as it has been pleased to call such creations.

Matter as a Possibility of Sensation.

The more we grasp the nature of the problem, the more we are convinced that the material world is not the self-revealing object of knowledge which in the innocence of a non-reflective state of mind men usually suppose it to be. The apparent contradictions in the definition of an atom may grow out of our imperfect statement of the case, or out of our mental inability to keep before the mind exactly the same idea in two remote parts of a discussion. We are constantly subjected to danger in our reasoning through the evasive content of middle terms. But an impediment to our comprehension of matter more serious than the alleged inconceivability of its constituent atoms is presented by those who deny our

capacity to know of its existence. Our knowledge of a space-occupying world, independent of thought, is challenged at its very source. In his analysis of the process of perception, the late John Stuart Mill,[1] following in the path of Berkeley and Hume, refuses to admit our immediate knowledge of material objects of any kind, and holds that we merely infer their existence through the sensations by which alone they are apprehended. He goes even farther than this, and denies the validity of this inference. We are left, therefore, with certain "permanent possibilities of sensation," which we name the world of matter. Beyond the impenetrable wall that hems in our consciousness we cannot pass. All that we may attempt to imagine beyond our own consciousness must be in terms of our sensations, or of the ideas developed from them, and these can have no validity beyond their own particular sphere.

Undoubtedly the doctrine of the immediate perception of objects, as held by Sir William Hamilton[2] and attacked by Mill, cannot be maintained in the light of our present knowledge. Psychological analysis of the process of perception proves that what we call "objects" are perceived only through the union

[1] John Stuart Mill, *Examination of Sir William Hamilton's Philosophy*, vol. i, pp. 234, 250.

[2] Sir William Hamilton's *Lectures on Metaphysics*, pp. 279, 396.

in our minds of impressions upon our senses which are only representative of the objects themselves. What we call "things," that is, visual or tactual configurations in space, such as books, tables, houses, etc., are results of our own mental activity in grouping together various impressions which, in their unrelated state, are only the elements of construction, not individualised objects. But while the immediate perception of such complex and yet individualised objects cannot be maintained, in every "impression" there are involved the correlative terms "subject" and "object." However elementary such impressions may be, and their elementary character must be conceded, in every sensation there are to be found a subject and an object. The knowing subject apprehends objects and distinguishes them from itself. The construction of definite configurations is, it is true, a psychical process, an effort to put together in thought what is presented as reality, and to do this in conformity to the order and measure of successive presentations. By whatever subtle alchemy of brain and nerve this is effected, subject and object always stand over against each other as different modes of being. To say that sensations in the knowing subject are *uncaused*, is to break with the principle of continuity. We, therefore, refer our sensations to causes in space by which they are pro-

duced, and these causes are not mere permanent "possibilities" of sensation, they are forms of real being which precondition and determine feeling and knowledge in us. Collectively we call them "matter," which cannot be sublimated into a mere "possibility," but is an actuality whose properties are to be discovered in and through continued experience. Inasmuch as it constitutes our constant environment, it is pre-eminently the form of reality with which, in a general sense, we are most familiar. It cannot legitimately be identified with our thought about it, for our thought is sometimes erroneous, and yet it is the continuous substratum of our thought, which is chiefly occupied with some aspect of it. Experience shows it to be a realm of inquiry and investigation which continually rewards observation and experiment. We find that its phenomena are subject to law and capable of repeated verification. Instead, therefore, of pronouncing it "inconceivable" or dismissing it as a mere "possibility of sensation," the genetic method leads us to inquire what science has discovered regarding its nature and its laws.

The Cosmic Data of Matter.

If looking twice at one object renders us doubly certain of its existence and properties, the consensus of science regarding it should give us an almost

infinitely increased assurance; for this consensus is the unanimously accepted result of the most prolonged and studious investigation of experts, stimulated by the hope of making some correction or amplification of others' labours, and aided by every appliance which human ingenuity has invented. It is not the testimony of the untrained individual observer, but of specialised experimenters. It invites the keenest criticism of its methods, and fortifies its affirmations by all the tests of repeated verification. Whatever his subsequent treatment of them may be, the modern philosopher, of whatever school, must first of all reckon with the accumulated facts which science has established.

By the process of scientific synthesis there has been elaborated a cosmic conception which is not, indeed, a mere collection of sense-phenomena, but an order of ideas based upon an ever-present reality, permeated everywhere with mathematical consistency, and reduced to the harmony of a rational system. It is true, that it is limited in extent both in time and space, which is a proof of its essential coherence, and yet it fatigues the powers of even a trained intellect to compass and comprehend its totality. To say that its whole contents, including the categories of time and space in which it is embraced, are only the subjective creations, or "functions,"

of the mind of man, — is like trying to make a pyramid stand upon its apex instead of upon its base.

It would be mere useless pedantry to offer here a complete array of the facts, which science has discovered and demonstrated, regarding the vast and varied masses of matter that are brought within our ken. A mere outline of the leading results, to serve as a reinstatement of our knowledge, will amply suffice for our purpose.

Every mere sensation of linear distance is hopelessly exceeded by the idea of one hundred miles, only the quarter of a modern day's travel. In this long perspective we may symbolically place houses and villages, meadows and forests, but they have only a dim pictorial quality. When we speak of a thousand miles, we pass into the sphere of mere symbolic notation, a realm of purely mathematical concepts. Multiply this distance by the number of hours in a day, and we arrive approximately at the girdle of our globe. No possibility of conception is exceeded, but we have now wholly passed the limit within which we can even hope to form a mental equation between sensation and distance, and yet our earth is only a floating particle in the system to which it belongs. To reach the moon, our nearest neighbour, we must travel ten

times the circumference of our planet. If a cannon-ball could be fired into the sun, it would require fifteen years for it to reach its destination. Had the Pilgrim Fathers, who sailed from Delftshaven for America in the Mayflower, taken a limited express train for the sun, they would not at this time have arrived at their journey's end. "It has been found," says Professor Langley, "that sensation is not absolutely instantaneous, but that it occupies a very minute time in travelling along the nerves; so that if a child puts its finger into the candle, there is a certain almost inconceivably small space of time, say the one-hundredth of a second, before he feels the heat. In case, then, a child's arm were long enough to touch the sun, it can be calculated from this known rate of transmission that the infant would have to live to be a man of over a hundred years before it knew that its fingers were burned."[1]

The sun itself bears such a proportion to the earth that, "if we could hollow out the sun's globe and place the earth at the centre, there would still be so much room that the moon might go on moving in her present orbit at two hundred and forty thousand miles from the earth, — *all within the globe of the sun itself*, — and have plenty of room to spare."[2] But the sun is only a star, and one of relatively small

[1] S. P. Langley, *The New Astronomy*, p. 5. [2] *Id.* p. 5.

magnitude. With the unaided eye about five or six thousand stars may be seen in the whole heavens. With a good opera-glass as many as one hundred thousand become visible. The Lick telescope, with an object-glass three feet in diameter, reveals nearly one hundred million. When we try to form a conception of these dizzy distances, intelligence staggers and reels beneath the burden. Light, travelling at the rate of one hundred and eighty-six thousand miles a second, would require three and a half years to reach us from the nearest of these blazing suns. From the more distant, thousands of years may have been required. "That light we see from them to-day left them before America was discovered, before Jesus was born, before the pyramids were built, and, for all we should be able to see, they might have ceased to exist long ago, though their light continues to shine."[1] It is not wonderful that Kant exclaimed, that the two facts which most stirred his mind to reverence were "the starry heavens above and the moral law within."

The Constitution of Matter.

In so vast an assemblage of material masses, it would seem at first that a great variety of elements might exist throughout space, each system differing

[1] A. E. Dolbear, *Matter, Ether, and Motion*, p. 28.

from its companions in its ultimate constitution. On the contrary, science demonstrates that there is but little difference, except in temperature. Chemists have discovered about seventy different elements, or substances which are incapable of being reduced to simpler constituents, upon our planet. The most distant stars also, as the spectroscope testifies, contain the elements which are found upon our earth. Some nebulous bodies show the presence of but few elements, and these sometimes are indicated by only a portion of their spectroscopic lines, suggesting that even the so-called "elements" may in reality be compounds. In the sun there is discovered a substance called "helium," from its supposed presence in that body alone, which is lighter than hydrogen, the lightest of the terrestrial elements. But, generally speaking, the matter of stellar space and that of the human body are identical, — in the strictest sense *the same elements*. In the South Kensington Museum there is a curious collection which is both impressive and instructive. It is the representation of the body of man resolved into its chemical constituents, each of which is contained in a lettered vessel of appropriate size. There is a jar containing as many gallons of water as there are in our blood and tissues. Another shows the amount of carbon; another, the quantity of calcium; still others hold our just pro-

portion of iron and phosphorus; and smaller ones contain the minute traces of the least constituents. This array of elements is, indeed, far from being a man, or even the body of a man, but it indicates our relationship with the most distant stars and nebulæ, our close kinship by the genealogy of matter, for we are "children of the sun," their brother. It also shows, when united with the testimony of the spectroscope, that wherever light travels matter is essentially the same.

Seeing that all matter is made up of elements usually united into compounds, we pass to consider the analysis of its forms. The first mode of separating it into parts is physical, and gives us the *molecule* as its ultimate term. If our minds are overwhelmed by the magnitude of its aggregates, they are not less affected by the smallness of its constituents. Faraday estimated that the particles of gold in the ruby-coloured liquid solution of gold, in which a bit of phosphorus has been placed, do not exceed the five-hundred-thousandth part of a portion of the liquid. One-eighth of a grain of indigo, dissolved in sulphuric acid, will impart its blue colour to two and a half gallons of water, which is about the millionth part of a grain to a drop of water. A grain of musk will scent a room for many years, losing but little of its weight, although it sends off its particles into

thousands of cubic feet of air. A spider's web is so delicate that an ounce of it would make a line three thousand miles long, a cable across the Atlantic.

Not only may the extreme fineness of molecules be illustrated by such familiar examples as these, but they may also be measured with a close mathematical accuracy. A late estimate has given one fifty-millionth of an inch as the approximate diameter of a molecule of water. The process of measurement to the one ten-millionth of an inch is demonstrative, being based on the interference of light-waves of known length.

But the chemical analysis of matter extends much farther than this. The mathematical laws governing chemical reactions show that there must be still finer particles than molecules, particles which have never been broken up by any human means, as molecules may be, and which are, therefore, regarded as ultimate and irreducible. These ultimate particles are called *atoms*. They are the constituents of the elements themselves, as iron, silver, oxygen, and hydrogen. The atomic theory was held by Democritus, Lucretius, and other ancient philosophers, but not for the same reasons, or in the same form, as it is held by modern chemists. "Ask any chemist to-day," says Professor Dolbear, "why he holds the atomic theory of matter, and he will reply that he

can isolate the elements, and by no process yet discovered can they be more finely divided; that he can measure their individual magnitude and weigh them, prove their existence in the sun and stars; so that the weight of evidence is exceedingly great. He will never think of assigning any such reasons as the early philosophers gave for their teaching. Many of the properties of bodies of visible magnitude depend upon the number and arrangement of the molecules that compose them, but the properties of atoms are fundamental and not subject to change. All substances are identified by means of their properties, and the chemical properties of atoms are among the most important. Not only do atoms combine together in groups called molecules, consisting of two or more atoms, but they combine in definite proportions by weight, and only so; and these proportions are called the atomic weights of the elements, and are known for all of them."[1] The atoms are, therefore, not phenomena of sense, but modes of reality mathematically involved in the processes of change. A molecule of water, for example, is a compound made up of two atoms of hydrogen and one of oxygen, both of which are invisible. The highest power of a microscope enables us to see the one hundred-thousandth of an inch. Five hundred

[1] A. E. Dolbear, *Matter, Ether, and Motion*, p. 239.

atoms, it is estimated, would form the diameter of that field of vision. In this space would be contained one hundred and twenty-five million atoms, and to see one of them we should need to increase our power of perception through the best microscope at least five hundred times.

"We have read," says the writer last quoted, "of spirits that could dance on the point of a needle; but the point of a needle would be a huge platform when compared with this last visible point with the microscope, and the spirit that should dance upon it might be a million times bigger than an atom of matter, and not be in danger from vertigo. One may be astonished at the amount of intelligence associated with the minute brain-structure of some of the smaller forms of animal life — say the ants; but it will be seen that so far as such intelligence is associated with atomic and molecular brain-structure, the size of the brain in the smallest ant, though measured in thousandths of an inch, is sufficiently large to involve billions of atoms, and the permutations possible are almost unlimited." [1]

The Dynamic System of Matter.

We learn from the chemical properties of matter that its atoms are not isolated, unrelated entities, de-

[1] A. E. Dolbear, *Matter, Ether, and Motion*, p. 20.

void of resident powers, and indifferent to one another's destiny; but, quite to the contrary, that they are interaffiliated modes of being, centres of dynamic activity, and members of an organised society. Of these innumerable submicroscopic realities it may be said, that not one of them is a vagrant without family ties, capable of being wafted off into space as a useless or functionless outcast. Newton's law of gravitation shows that every one of these ultimate particles, if we choose to regard them temporarily as ultimate, is bound to every other one in the universe by a reciprocal dynamical relation. The examination of any mass of matter shows us that the molecules of a solid, a liquid, or a gas, — in which forms it is believed that any one of the elements may exist, — have a relation that is measured by the presence of heat, so that a cohesive force is resident in every material mass. Chemistry goes farther, and demonstrates the presence of chemical affinity between the atoms, a selective agency which sorts and segregates them without the intervention of external agency.

Physics and mechanics reveal a yet wider dynamical relation. Of all the modes of energy, kinetic or potential, we know of none not capable of being received and conveyed by matter. All so-called "forces" are now known to be correlated. Heat, light, electricity, magnetism, mechanical energy, and chemical affinity,

are capable of translation into one another. These are not so much forces as *force*, one reality susceptible of metamorphosis into various forms under varied conditions. All modern discovery has tended to confirm the conception of Boscovich, that matter is a system of *force-centres*, in relatively stable or moving equilibrium, distributed in space; not a collection of inert space-occupying blocks moved only when swept by some tempest of incident motion. The firmest generalisation of physical science is, *that matter is essentially dynamic and essentially one.*

The Genesis of the Elements.

This schematic unity, which makes all the elements of matter parts of one system, implies, although it does not prove, that they are also one in essence and derivation. All that is required for the establishment of this proposition is conclusive evidence that all forms of matter are transformations of a primordial substance or energy. This at first seems improbable, for the very idea of an "element" is that which cannot be further reduced, or resolved into something simpler. But recently discovered facts have suggested the evolution of our elements from a single primary form of matter. "Fifty years ago," says Professor Huxley, in his historical sketch of scientific progress during the reign of Queen Victoria, "such

a suggestion would have been scouted as a revival of the dreams of the alchemists. At present it may be said to be the burning question of physico-chemical science." [1]

But even before these facts were formulated, Sir William Thomson had propounded his theory of vortex-atoms. Briefly stated, it is this: — Helmholtz discovered by mathematical processes that if a vortical motion were set up in a frictionless medium, the motion would be permanent, and it could not be transformed. Sir William Thomson concluded that, if such motions were set up in the ether, the persistence of their form and the possible variety of motions would correspond closely to the known properties of matter. What such vortex-rings would be like, if they were visible, may be illustrated by the rings of smoke sometimes puffed up from the smoke-stack of a locomotive, when the steam is suddenly turned on and the air is very quiet. The same phenomenon is often produced by smokers of tobacco. But such rings are soon dissipated by the friction of the air. If, however, the medium were *frictionless*, the rings would persist forever. The ether has been thought to be a non-atomic, homogeneous, universal, frictionless medium. Assuming the existence or possible origin of such vortex-atoms, the theory has

[1] T. H. Huxley, in Humphrey Ward's *Reign of Queen Victoria.*

several advantages over that of rigidly solid atoms. Their different velocities of rotation would account for the different kinds of atoms and their power to combine. Their ring-shape would explain their capacity to unite in close coherence with one another. Their movements would account for the resident energies of matter. Their common origin would explain their distribution in space. Their action on the surrounding ether, if this were possible, might create lines of strain which would explain gravitation. The supposed indestructibility of matter would be merely the persistence of their rotation. They would be actually indivisible, because each atom would persist as a complete self-conserving whole, escaping by its own retreat every attempt to dismember it. The obvious difficulties are, to show (1) how such vortex-rings would have any effect whatever upon a *frictionless* medium, as the ether is assumed to be; and (2) how such rings could, in the first place, be *originated*. Stewart and Tait,[1] therefore, suppose that the ether is a medium in which there is a *slight* friction. In that case the first difficulty may be removed, but the motion, and hence the duration, of such atoms cannot be persistent. Still, they may be relatively persistent, slowing down by an imperceptible rate of retardation. Their motion will ultimately cease, when

[1] See the discussion in *The Unseen Universe.*

their work is done. The world of matter would thus pass away, if not renewed. The problem of origination, however, still remains unsolved. It must be referred to some anterior mode of being capable of initiating this vortex motion. What that might be, we cannot answer, for in our experience motion originates only from prior motion. But perpetual motion, by the very hypothesis, we cannot attribute to such vortex-atoms.

The principal objection to this theory, as a whole, is, of course, that it is merely a theory, having nc basis in fact but only in possibility. It is at least conceivable as far as it goes, after it is once set going. But, while it avoids the difficulties with which Mr. Spencer and Mr. Fiske invest their hypothetical atom, it has the defects of its peculiar excellence, and simply translates the perplexities of space into the terms of an unknown beginning in time. It makes the universe something finite in duration. Whether or not this is decisive as an objection, however, we shall consider in another connection.

But the facts, which were lacking to confirm Sir William Thomson's theory, are no longer wanting in confirmation of some theory of the genesis of the existing elements from a common primordial source. Prout formulated a periodic law, according to which the atomic weights are multiples of the atomic

weight of hydrogen, the lightest of the known elements, and he concluded that this is, therefore, the parent of all the rest. The existence of nebulous matter apparently composed of hydrogen only, seemed to confirm this hypothesis. Recently, however, the Russian chemist, Mendelejeff, following Newlands, has shown that, if the elements are arranged "in the order of their atomic weights, from hydrogen as 1 to uranium as 240, the series does not exhibit continuous advance, but breaks up into a number of sections, in each of which the several terms present analogies with the corresponding terms of other series."[1] By this arrangement he succeeded in showing that certain elements, not previously known to exist, are required to complete the programme. The chemical and physical properties of these "missing links" he accurately described. What is most wonderful is that some of these previously unknown elements have been discovered, possessing the properties which Mendelejeff predicted they must have. This places the theory upon a strong vantage ground, for it endows it with a predictive value analogous to that of astronomy. It was Bode's law which led Leverrier and Adams to assign a position to an unknown planet from the anomalous movements of Uranus, so that Dr. Galle, of Berlin, at Leverrier's

[1] Ad. Wurtz, *Atomic Theory*, pp. 154, 163.

suggestion, turned his telescope to the indicated portion of the heavens, and discovered the planet Neptune. Conclusive as this seems, however, there is still a possibility that we have here only a remarkable coincidence; for the late Professor Benjamin Pierce, said to be "one of the most competent mathematicians that ever lived," declares that Galle's discovery was only a "happy accident," the calculations being only approximately correct, and equally valid for a planet one hundred and eighty degrees from the one discovered.[1]

Dr. G. Johnstone Stoney has carried the periodic law still another step, deriving a logarithmic law of atomic proportions from a comparison of the cube roots of the atomic weights.[2] This extension of the theory requires the existence of three elements lighter than hydrogen, which, therefore, cannot be the primordial term in the process of atomic evolution. Thus, all investigation of the subject points to something simpler and simpler as the first form of matter, until we pass beyond the limits of the most attenuated and etheric of its present known forms. Many of the leading chemico-physical investigators of our time, such as Mr. Lockyer, Mr. Crookes,

[1] Benjamin Pierce, *Ideality in the Physical Sciences*, pp. 200, 211.

[2] *Proc. Roy. Soc.* for April 19, 1888, p. 115.

Dr. T. Sterry Hunt, and others, have devoted much time to this line of inquiry.[1] They substantially agree with the statement of facts here given by Professor F. W. Clarke: — "There shine the nebulæ in the heavens, and the spectroscope tells us what they really are, namely, vast clouds of incandescent gas, mainly, if not entirely, hydrogen and nitrogen. If we attempt to trace the chain of evolution through which our planet is supposed to have grown, we shall find the sky is full of intermediate forms. The nebulæ themselves appear to be in various stages of development; our earth is most complex of all. There are no 'missing links' such as the zoölogist longs to discover, when he tries to explain the origin of species. First, we have a nebula containing little more than hydrogen, then a very hot star with calcium, magnesium, and one or two other metals added; next comes a cooler sun in which free hydrogen is missing, but whose chemical complexity is much increased; at last we reach the true planets with their multitudes of material forms. . . . We see the evolution of planets from nebulæ still going on, and parallel with it an evolution of higher from lower kinds of matter."[2]

[1] A compendious account of these investigations is given by James Croll, *Stellar Evolution*, pp. 69, 112.

[2] F. W. Clarke in *Popular Science Monthly* for February, 1876. See also the January number for 1873.

The Distribution of Matter.

The genesis of the elements, and the distribution of matter in space, seem to be owing to a single cause, or at least dependent on a single condition, the presence of heat. Thus, the splendid conception of Kant, in his natural history of the heavens, and the brilliant nebular hypothesis of Laplace, are correlated with the most probable theories of the nature and origin of matter itself. We may not, indeed, see in the superheated star-dust of the nebulæ the "promise and potency" of all life and thought, of all the sweet and noble passion of our sensitive world, but this may be owing to the important fact that, in forming these physical conceptions we have started only with objects of sense, leaving out of the account the conscious subject which perceives them, with its own equally necessary antecedents. Beginning with the shell of being, we have found it to be truly one in substance; but we must not permanently exclude that inner phase of it which is as essential to the very act of perception as objects themselves, — the conscious unity by which they are apprehended. If, within this inner kernel, without which the shell would be empty and meaningless, we find that the idea of purpose is quite as necessary as the idea of force,

we must subject this idea also to a penetrating analysis, and strive to discover the correlation between its final form and the energy with which it is associated. But we may not leap from one series of phenomena to another, and, therefore, we may not hastily refer the origin of the elements and the distribution of energy to a being of a kind so different from matter as conscious mind is known to be. For this reason we must resist the temptation to drop the thread of continuity, which we have thus far patiently followed, and to assume, at the point of origin of the material world, a spiritual being, whose volition presided over the birth of matter. This assumption may be the truth, and it may be capable of being proved true in some other way and by some other avenue of approach. But, if such a "catagenesis," or deposition of matter as the sedimentary action of mind, — which Professor Cope has suggested,[1] — be the final explanation of the origin of matter and its cosmic arrangement in space, we cannot reach it from the objective side of being. Mental weariness or confusion, consequent upon so long an intellectual journey as this discussion involves, may betray us into a sudden slip of thought by which we lose the thread we follow; but to displace it knowingly, with an entirely dif-

[1] E. D. Cope, *Origin of the Fittest*, p. 422.

ferent conception, would be to reject the genetic method as completely as if we substituted for gravitation an elephant or a tortoise as the final supporter of the earth. We must, then, in conformity with that principle of continuity which is at once the law of things and the law of thought, affirm that the distribution of matter is, from the objective side, a wholly dynamical problem. If all the actions which make up human history were apprehended simply as forms of motion, we could never by any logical process translate them into other terms. On one condition only could they be referred to the dominion of determining thought and free volition. That condition is, that thought and volition are somewhere known as determining factors in the direction of motion.

The Dissipation of Energy.

If the distribution of matter in space be regarded as a purely dynamical problem, heat is the one agent which can be evoked to solve it. Our solar system is the product of a cooling nebula which once filled the orbit of Neptune, but has thrown off as milestones of its centripetal journey the masses of matter which constitute the planets. The details of this now generally accepted theory are too numerous and too familiar for mention here, but the facts of astron-

omy seem to admit of no other explanation. The process of cooling in the great central remnant of this nebula, the sun, still continues. Professor Langley thus estimates the rate of this process: —

"If we would look into the future, we find that, at the present rate, we may say that the sun's heat-supply is enough to last for some such term as four or five million years before it sensibly fails. It is certainly remarkable, that, by the aid of our science, man can look out from this 'bank and shoal of time,' where his fleeting existence is spent, not only back on the almost infinite lapse of ages past, but that he can forecast, with some sort of assurance, what is to happen in an almost infinitely distant future, long after the human race itself will have disappeared from its present home. But so it is, and we may say, — with something like awe at the meaning to which science points, — that the whole future radiation cannot last so long as ten million years. Its probable life in its present condition is covered by about thirty million years. No reasonable allowance for the fall of meteors, or for all other known causes of supply, could possibly, at the present rate of radiation, raise the whole term of its existence to sixty million years." [1]

What becomes of this incalculable fund of energy

[1] S. P. Langley, *The New Astronomy*, p. 107.

continuously radiated into space? Only one two-millionth part of it falls upon our earth in the form of solar heat and light. Nearly all of it is prodigally radiated into apparent vacuity. The dying sun will at last become as cold and powerless as the moon, a mere mass of inert matter floating in space, with its retinue of lifeless planets. Ours will then be a dead system, and, as the same process is going on everywhere, it would seem that there must be at last a dead universe, from which all energy has forever departed.

Palingenesis.

But, admitting that our solar system had a beginning and will have an end, and also that matter is the product of evolution from one simple and homogeneous substance, — conclusions which science renders highly probable, — we are left with this primordial "protyle," as Professor Crookes has named it, or "ether," as others prefer to regard it, as the fathomless ocean in which the wrecked worlds will float. We have no evidence that heat or light can travel where this universal substance does not exist. If this has limits, they set bounds to the journey of radiated energy, and suggest the possibility of a return march. Rankine attempted to show that when more energy is gathered at the perimeter of the universe than there is at its central region, it

must return and rekindle the dead suns and planets with its touch of fire, and thus fill vast spaces once more with fiery nebulæ which will run anew the course of system-building. Clausius seemed to settle this point adversely by his discovery of the laws of the radiation of heat. But if energy can be thus banished from the universe never to return, all our knowledge of it is worthless, for it might be annulled in time as well as in space, and there is no fixed law of physical causation. The most recent authorities speak with reserve, therefore, upon this subject. "It is not wholly safe," says Professor Young, "to assume that there may not be ways, of which we as yet have no conception, by which the energy, apparently lost in space, may be returned."[1] There is, then, the possibility of palingenesis, of innumerable re-births of matter, and its mighty systems. Some physicists hold that the chemical elements themselves are subject to decay. "That they are not only generated but destroyed — that they are subject not only to evolution but dissolution. They believe that the generative process probably takes place only at the confines of the universe, and the destructive process at the centres of overgrown stars, which is the position of lowest potential."[2] It is not impossi-

[1] C. A. Young, *The Sun*, p. 277.

[2] James Croll, *Stellar Evolution*, p. 102.

ble that in great masses of matter, like extinct suns, the elements may gradually lapse into the original parent substance, and the energy dissipated into space may generate new elements in other portions of space. It is true that such hypotheses have an extreme tenuity, and little or no support in observed facts; but they may save us from intellectual confusion by showing that there are possible ways of restoring and redistributing the energy, which the law of continuity requires should not collapse into nonentity.

"We have often witnessed the formation of a cloud in a serene sky. A hazy point barely perceptible; a little wreath of mist increases in volume and becomes darker and denser, until it obscures a large portion of the heavens. It throws itself into fantastic shapes, it gathers glory from the sun, is borne onward by the wind, and, as it gradually came, so, perhaps, it gradually disappears, melting away in the untroubled air. But the universe is nothing more than such a cloud, — a cloud of suns and worlds. Supremely grand though it may seem to us, to the infinite and eternal intellect it is no more than a fleeting mist. If there be a succession of worlds in infinite space, there is also a succession of worlds in infinite time. As one after another cloud replaces clouds in the skies, so this starry system,

the universe, is the successor of countless others that have preceded it, — the predecessor of countless others that will follow." [1]

At what point, in such an infinite series of possibilities, shall we venture to place an absolute creative act, behind which there are no data of the objective, but only those of the subjective order? A great theologian, Dr. James Martineau, has said: "To raise the question whether a pure subjectivity can give rise to its own objects is to propose an empty riddle. Its sense is zero; and the answer can only be its echo. An 'absolute subject' is no less a contradiction in thought than a single-termed equation, or an uncaused effect. To be a 'subject' is to have an 'object,' and hold an existence, not 'absolute,' but relative; and the moment we conceive of mind at all, or any operation of mind, we must concurrently conceive of something other than it as engaging its activity." [2]

There is no form of human knowledge that so expands and elevates our conception of Being, giving us the right to speak of it as "divine," as the vision of a world-process perpetually unfolding, never postponed by a necessity of previous deliberation, and never interrupted by circumstances unforeseen or

[1] Quoted by S. P. Langley, *The New Astronomy*, p. 248.

[2] James Martineau, *The Seat of Authority in Religion*, p. 32.

impulses felt for the first time. The most radical antithesis between the "human" and the "divine" is, that to man all things are once new, while to divinity all are eternal. A deity to whom creation could be a fresh experience would be one who had something new to learn.

Thus "matter" is found to be no finality whose ultimate mystery is open to the inspection of the senses, but the passing aspect of an eternal process, the temporary yet, perhaps, oft-repeated product of a Being whose infinite energy it partly expresses, but whose nature and potency cannot be wholly measured by its forms and forces. It compasses, it is true, all that human touch and vision can attain, but the limits of this disclosure are in man's power of apprehension, not in the Being of whom this manifestation is apprehended.

> "Shall any gazer see with mortal eyes,
> Or any searcher know by mortal mind?
> Veil after veil will lift — but there must be
> Veil upon veil behind."

II.

THE GENESIS OF LIFE.

"LIFE" is an abstract idea derived from a comparison of living beings. All the objects of which it may be predicated are composed of matter in its organised forms, and endowed with certain powers of movement. So far as it is possible for us to regard life objectively, it consists in phenomena of motion. We can study it only by examining living examples. Accordingly, we turn to the living world with the question, Can the phenomena of life be explained in the terms of matter and its energies, and thus be unified with the phenomena of the material world?

"A generation ago," says a distinguished naturalist, "we conceived that 'matter' was an inert something which was quickened into activity by energy, and that this energy was in its nature essentially different from the physical basis of the universe. The confidence of those who held to the opinions commonly termed 'materialistic' was largely due to

this belief in the dual organisation of nature. . . . Of late years, however, the opinion has been gaining among physicists that matter itself is but a mode of action of energy, and so in place of the dualistic basis, naturalists are being driven to a conception of unity as regards the phenomenal world. . . . The most important effect, from that new aspect of our science which we term Darwinian, is found in the fact that it has forced students to look upon each separate organism as a mere phase in the propagation of a great impulse, which has been transmitted through an inconceivably long series from the remote past." [1]

The Roman poet, Lucretius, conceived the derivation of life from material combinations, but the idea practically languished until the time of the French naturalist Buffon, in the middle of the eighteenth century. He emphasised anew the idea of the transformation of living organisms under the action of physical laws; but it was reserved for the nineteenth century to invent detailed hypotheses for the explanation of the derivation of species and the physical determination of life. In 1809 the French naturalist Lamarck published his work entitled *Philosophie Zoologique*. This was received as a novel and absurd attempt to carry speculation into the domain

[1] N. S. Shaler, *The Interpretation of Nature*, pp. 284, 285.

of empirical science, and was treated with almost universal distrust. The then known facts of morphology were decidedly against it, while the elementary knowledge of the infertility of hybrids, and the wide variation of individuals within absolutely fixed limits, seemed to be a final refutation of the origin of new species. Embryology was in a most imperfect state, and threw no important light upon the problem of development. Above all, the indifference and opposition of influential naturalists, of almost official authority, like the great Cuvier, then the most learned and the most brilliant lecturer and writer upon animal forms, tended to render the theories of Lamarck, unsupported by any array of facts, and resting almost wholly upon purely mental conceptions, not only unfashionable but apparently unscientific.

The Theories of Darwin.

Such was the situation, with some slight increment of knowledge of embryology, when, in 1859, Charles Darwin published his *Origin of Species*. The mass of facts industriously collected from every available quarter, the candour and skill displayed in presenting these facts, and the new, ingenious, and luminous theory advanced to explain them, attracted universal attention. With the statement of the theory of

natural selection, coupled with the growing dissatisfaction with the theory of permanent types, as embodying a group of unrelated and inexplicable forms, there was awakened a general interest in the doctrine of evolution. From that time to the present there has been a constantly increasing disposition to accept evolution as a fact, and with a hope that its confessedly considerable difficulties might be explained. At present there is probably no biologist of importance who does not accept organic evolution as a real process of nature, although there are various degrees of conviction as to the sufficiency of the explanation of the causes which have been operative in the natural history of descent.

The theory of natural selection, now the common property of all intelligent men, has been described by Herbert Spencer as "the survival of the fittest," an expression which Darwin accepted with approval and acknowledgment. The theory may be briefly stated as follows: — A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Linnæus calculated that, if an annual plant produced only two seeds — and there is no plant so unproductive as this — and their seedlings next year produced two, and so on, then in twenty years there would be one million plants. The elephant is the slowest breeder among animals.

If it begins breeding when thirty years old, and goes on breeding till ninety years old, bringing forth six young in the interval, and surviving till one hundred years old, after a period of from seven hundred and forty to seven hundred and fifty years, there would be nearly nineteen million elephants alive, descended from the first pair. Obviously the conditions of life will not permit this. Some of these contestants for life must die for want of food or in battle for it. The fittest will survive. Those animals will be most fit which have some advantage over the others. Whenever, in animals, variations appear which are of advantage to their possessors, these animals, and the same is true of plants, will survive, or will be naturally selected. Under the operation of this principle, new organs, rendered possible by variation, if advantageous to their possessor, will be slowly built up, and from such variations species may originate.

Natural selection is evidently an operative and potent principle of explanation, provided there are given variations that are useful as the basis of selection, but it depends for its validity entirely upon this condition. If generation after generation of any given plant or animal never varied in any degree from its predecessor, it is evident that natural selection could not operate, for all the individuals of a

given species would be uniform. This difficulty Darwin fully realised and candidly admitted. He did not, however, attempt to supply an explanation of the origin of variations. The problem is a serious one. The inability to explain variation would not, of course, invalidate the principle of natural selection, for variations do occur and their occurrence is not denied. Still, until we can explain the origin of variations, and of variations of some degree of usefulness to the plant or animal, we have by no means explained evolution. It is conceivable that special creative interpositions may be introduced in living organisms with the intention of imparting to individuals some new advantage, and that thus progressively new species may be produced. Darwin did not profess to explain the whole of evolution. As one might be an evolutionist without being a Darwinian, — that is, might believe that species are derived, without accepting natural selection, — so one might be a Darwinian without being in the strict sense an evolutionist. He might say, for example, with Darwin, that the course of development begins with a certain number of created germs differing in character from one another. He might then hold that at different stages of development the Creator introduced variations, and that these were the starting-points of new species. This is the position of Mivart

and others. Darwinism, therefore, as an explanation of evolution, is confessedly incomplete. The fundamental problem is this: Given a unicellular organism, how is it made to vary so that variation will be useful to it? Or, more broadly, given any organism, how is it made to vary so that its variation shall be an advantage to it in the struggle for existence?

The Origin of Variations.

The first contribution toward the answer to this question is derived from a rival theory of evolution. This is the theory of isolation by migration, proposed by Moritz Wagner, a German naturalist. Among many animals in the same locality, argues Wagner, any advantage that might arise through favourable variation would be soon lost through intercrossing. Natural selection, therefore, is inadequate to the explanation of the development of a variation as well as to the explanation of its origin. But, if a pair of animals, or a very few, having an advantageous variation, are separated from the rest by migration, this isolation insures their preservation of this advantage by a security from intercrossing similar to the interference of an artificial breeder. The favoured pair are kept together and kept away from all deteriorating associations. The theory may be thus applied to

man, for example. The ancestors of man were, let us suppose, anthropoids of tropical Asia. One pair, or a few pairs, wandered northward, and their retreat was cut off by physical causes. If they had any special intelligence or dexterity, they would preserve it by their isolation from deterioration. They would be compelled to struggle more severely for existence than in the luxurious tropics. Hence, new variations would arise and be transmitted, and they could not be diluted by intercrossing in the migratory state, for the weaker would be left behind. Thus, by degrees, perhaps, the cavemen of Europe were produced. It must be admitted that, under such conditions, if hereditary characters are produced by changed environment, progress might be more rapid than otherwise. Still, the difficulties of the hypothesis are great, and it must be largely supplemented before it can be seriously entertained.

That variations may originate from the direct influence of the environment has been ably and skilfully maintained by the German zoölogist, Karl Semper. He claims that food, light, temperature, stagnant water and running water, and other such purely external and physical circumstances produce important changes in animal organisms. Even this is perhaps less important than the organic fellowship in which life is spent or lost. The surrounding

plants and animals affect both positively and negatively the conditions of growth of every animal.

Others have sought causes of variation in the internal factor. The German botanist Nägeli assumes an internal tendency toward progression and perfect development. This tendency causes organisms to vary in advantageous ways, so that they are impelled along new lines of advancement. According to Nägeli, natural selection is simply the name we give to the *result* of a battle, while it in no degree explains the cause of the superiority which decides the struggle. It has been well objected that such a "tendency" as Nägeli describes is not a true cause, but only a descriptive term. If organisms "tend" to vary, it is because there is some cause of variation whose presence is, indeed, implied in the word "tendency," but whose nature is not thereby defined.

Not widely different from the theory of inherent tendency is that proposed by St. George Mivart and shared by Owen and Kölliker. It finds the explanation of variation in extraordinary births. Species arise by descent, but through sudden modification. Smaller variations may arise from other causes within a species; but these variations only constitute varieties, which can never be developed into species. Mivart admits the reality of natural selection, but

deems it wholly inadequate to the explanation of the origin of species. He accepts Sir William Thomson's limitation of the duration of life on this planet, from the data furnished by the radiation of the sun's heat, to about one hundred million years, which is believed to be insufficient for the development of species by natural selection based on fortuitous variations alone. He cites Huxley's admission of sudden changes — "saltatory actions in nature" — as in harmony with his own theory. "According to this view, an internal law presides over the actions of every part of every individual, and of every organism as a whole. It is believed that this conception of an internal innate force will ever remain necessary, however much its subordinate processes and actions may become explicable."[1] This is, of course, the same as to say that the origin of species is inexplicable. Certainly such extraordinary births as Mivart cites are unexplained. Mivart's theory is allied to Nägeli's in proposing a descriptive statement as the whole available account of variations. Extraordinary births do occur, as for example in the case of the Ancon sheep, and the new form seems to be perpetuated without reversion by crossing. But these extraordinary births seem to require explanation even more conspicuously than the minor

[1] St. George Mivart, *The Genesis of Species*, p. 239.

variations upon which Darwin sets natural selection to work.

The need of a scientific explanation of variation has occasioned a return to the doctrines of Lamarck, which characterises the recent school of biologists known as neo-Lamarckians. This school is largely represented in America, and hence is sometimes called the American school. Its leading representatives are Professors Cope and Hyatt. This school looks for the explanation of variations neither in external nor internal factors alone, but in the activity of the organism itself bringing its internal growth-force into varying relations with external conditions. This was the theory of Lamarck. Growth is influenced by use and effort. Darwin admitted this factor, but considered it of slight importance; the new school regards it as the principal element of explanation. The size of the blacksmith's arm, the development of the gymnast's muscles, the acuteness of the musician's ear, — are familiar examples of increase in the strength or functional delicacy of an organ induced by use and effort. Physiology explains why growth accompanies exercise. Any increased use causes a greater flow of blood to the active organ, thus building up its constituent cells. The cuticle becomes hard by friction, as on the hand of a labourer; a hardened cuticle becomes an advantage

when an organ is used as a weapon of attack or defence, as on the head of an animal; and such a hardened spot may become an excrescence and finally a horn. Now, if the heredity of acquired characters is admitted, such advantages may be transmitted and increased from generation to generation, thus specialising any organ whose specialisation is advantageous. The specialisation of organs will finally result in the formation of varieties so remote from one another as to warrant us in designating them as new species. A limb specialised as a locomotive organ in water becomes a fin, in the air a wing, on the land a foot. A foot used on hard ground may become a hoof, used on soft ground a cloven hoof, for both locomotion and prehension a claw, and for prehension and manipulation a hand. The element of consciousness would be important; for it renders possible the sense of need. Need leads to spontaneous activity, which brings the organism into new relations to food, air, light, water, and a host of modifying conditions. If use is a cause of modification, effort to satisfy needs in varying conditions will result in variations of structure; because both the activities and the results of activity will be modified. If, now, we can assume that characters acquired by the individual can be inherited, and thus augmented in the progress of successive generations, we have a

real and satisfactory explanation of variations which, acted upon by natural selection, will supply us with a complete theory of modification.

But here our progress is obstructed by very serious obstacles. The blacksmith's arm, the gymnast's muscles, the musician's sensibility to tones, do not seem to be transmitted to their offspring. The complicated acquisitions of a linguist are not inherited by his child. Each child must learn to speak, and it speaks only that language which it is taught. When we come to special arts, such as fencing, playing on musical instruments, reading and writing, and other acquired arts, they do not appear to be inherited. Legal, medical, and other special knowledge cannot be conveyed by inheritance to children. If even some predisposition for such special acquisitions is inherited, this fact is not so obvious as not to require definite proof. The difficulty of the case is strikingly apparent in the non-inheritance of mutilations of the body. Soldiers deprived of legs or arms, mothers with scarred faces, do not have children without legs or arms, or marked as their parents are. Even inebriates do not always infect the blood of their children with alcoholic poison. The solution of the problem with which we started requires an explanation of heredity, in order to give us an explanation of variation. We must know precisely

why a child is like its parents, in order to know why it differs from them. Thus the problem of organic change involves the problem of organic permanence.

The Hypothesis of Pangenesis.

The first really scientific attempt to cope with the difficulties of heredity was the provisional hypothesis of pangenesis; so designated by Darwin himself, as if with a sense of its being only a transitional step to something better. It assumes the functional independence of the units of the body. Claude Bernard had maintained that each organ has its own proper life, its autonomy. The cell-theory had shown that each living cell is such an organ. But, as differentiated organs, all cells have their special properties. "It is universally admitted," says Darwin, "that the cells or units of the body increase by self-division or proliferation, retaining the same nature, and they ultimately become converted into the various tissues and substances of the body. But, besides this means of increase, I assume that the units throw off minute granules which are dispersed throughout the whole system; that these, when supplied with proper nutriment, multiply by self-division, and are ultimately developed into units like those from which they were

originally derived. These granules may be called gemmules. They are collected from all parts of the system to constitute the sexual elements, and their development in the next generation forms a new being; but they are likewise capable of transmission in a dormant state to future generations, and may be then developed. Their development depends on their union with other partially developed or nascent cells which precede them in the regular course of growth. Gemmules are thrown off by every unit, not only during the adult state, but during each stage of development of the organism; but not necessarily during the continued existence of the same unit. . . . Lastly, I assume that the gemmules in their dormant state have a mutual affinity for each other, leading to their aggregation into buds or into the sexual elements. Hence, it is not the reproductive organs or buds which generate new organs, but the units of which each individual is composed. These assumptions constitute the provisional hypothesis of pangenesis."[1]

Reduced to its simplest terms, the hypothesis is (1) that each cell in the body produces offspring having its own properties, as might be the case among independent unicellular organisms of different kinds;

[1] Charles Darwin, *Animals and Plants under Domestication*, vol. ii, p. 369.

and (2) that these offspring by their natural affinities group themselves together according to their relations in a living body, and then grow into cells like their parents. The assumptions are large, but if they are true, the theory accounts for the facts both of identical heredity and of acquired characters.

Weismann's Experiments.

In addition to the difficulty arising from its great complexity, the German naturalist Weismann finds a reason for rejecting Darwin's hypothesis in the very extent of its explaining power. It would explain not only the transmission of positive acquired characters, but, as Darwin expressly claims, such negative characters as mutilations also. "All the gemmules of the mutilated or amputated part," says Darwin, "are gradually attracted to the diseased surface during the reparative process, and are there destroyed by the morbid action." But Weismann maintains that there is no attested instance of any mutilation whatever being inherited. He affirms that, if any acquired characters were inherited, mutilations would be, but they never are, and hence he absolutely and emphatically rejects the possibility of the inheritance of any acquired character whatever. His experiments with white mice are of

somewhat striking interest. "These were begun in October, 1887, with seven females and five males. On October 17th all their tails were cut off, and on November 16th the first two families were born. Inasmuch as the period of pregnancy is only twenty-two to twenty-four days, these first offspring began to develop at a time when both parents were without tails. These two families were together eighteen in number, and every individual possessed a perfectly normal tail, with a length of eleven to twelve millimetres. These young mice, like all those born at later periods, were removed from the cage, and either killed or preserved, or made use of for the continuance of the breeding experiments. In the first cage, containing the twelve mice of the first generation, three hundred and thirty-three young were born in fourteen months, viz. until January 16, 1889, and no one of these had a rudimentary tail or even a tail but slightly shorter than that of the offspring of unmutilated parents."[1] The experiments were carried on until nine hundred and one young were produced by five generations of artificially mutilated parents, and yet there was not "a single example of a rudimentary tail or of any other abnormity in this organ. Exact measurement proved that there was not even a slight diminution in length." Weismann

[1] August Weismann, *Essays upon Heredity*, p. 432.

cites the case of supposed maternal impressions upon offspring, now, he says, "completely and forever abandoned by science," as an example of the way in which a traditional conception may linger on without evidence. He considers the idea of the inheritance of acquired characters an instance of the same type.

In the year 1872, Francis Galton called attention to the fact that certain mutilations are not inherited. The colts of horses with docked tails do not have short tails; the cramped feet of Chinese women are not inherited by Chinese babies; the result of circumcision for thousands of years has not been perceptible in Jewish children. Galton explains this non-inheritance by the supposition that the residue of the "stirp," or germ-substance, not used up in the formation of the body, is used for the formation of the sexual elements, and is thus transmitted to the next generation.

Weismann's Theory of Heredity.

Weismann follows out this idea in his theory of heredity. He holds that, if heredity is to be explained, its explanation is to be looked for in the reproduction of a simple unicellular organism. In the Amœba, for example, the body consists of a speck of almost undifferentiated protoplasm. Having no special organs, all food must be absorbed through the surface

of the body. When the body increases in size, the surface increases as the square of the dimensions, while the bulk increases as their cube. As the bulk increases faster than the surface, a point must be reached where, by mathematical necessity, the bulk is too great to be provided with nutriment through the relatively diminished surface. When this limit is reached, the body must divide, and thus two pieces are formed, each of which is exactly like the original, and this process is repeated. Each new animal is like its parent, because it is half of its parent. This is the simplest form of heredity. Every other form must be explained in the light of this. When an animal is developed from a fertilized ovum, this in the process of time becomes the parent of the entire body by combining its own products, which remain organically connected with it. The ovum of the dog differs from the Amœba in being able to develop into a complicated animal. Still, however composite, every animal develops from a single cell. In his latest publication, however, Weismann enlarges upon the "architecture of the germ-plasm," which is "inherited," and is led to the assumption of "groups of determinants" which he now speaks of as "ids." This ancestral "cell," which it is easy to call "simple," therefore, turns out to be complicated beyond our power to depict, although to the microscope it dis-

plays no perceptible difference from the cells of other species. If it is not difficult, however, to see how an Amœba develops from another Amœba, Weismann says, it should not be difficult to believe that the ovum of a dog may develop into a dog. The first act of a developing ovum is growth to a point of division, as in the case of the Amœba. Thus the one cell becomes two. One proceeds at once to develop into a dog. The other passes into the generative organs of this dog, where it lies dormant until certain conditions, summed up in the process of reproduction, are fulfilled, when it proceeds, like its parent, to produce two of its kind, an active and a dormant one, and so on indefinitely. The latent cell contains the "germ-plasm." This, it will be seen, is essentially immortal while the species continues to exist. It divides again and again, but the "old Adam" is still there. Like every unicellular organism, it has an absolute continuity of existence. Its offspring develop into animals, pass through all the stages of life, and individually die, but it lives on and continues to produce others like them. All bodies and all the derived germ-plasmic cells that are never brought under conditions of reproduction perish, but the original germ-plasm survives in the bodies of the living, and while the race lives it lives, in the loins of the survivors. The torch of life kindles new combustibles as it is

passed on, some of its imparted fire dies out, but the torch itself ever continues to flame, triumphant over all extinguishment. This is heredity according to Weismann.

Seclusion of the Germ-plasm.

It is manifest that, if thus explained, heredity allows no room for the transmission of acquired characters. Secure in its isolation from the fortunes of the body, whether good or ill, each generation derives from this isolated germ-plasm alone all its inherited characters. The life of the immediate parent cannot deeply affect the qualities of the offspring. These qualities are imparted by the germ-plasm, not by the parent through whose body the germ-plasm is transmitted. Whence, then, are variations? Why does not the offspring exactly resemble the parent, since both are the product of the same germ-plasm? Because each new individual grows out of the union of two germ-plasms, each of these out of two, and so on. Every child has two parents, four grandparents, eight great-grandparents, and sixteen great-great-grandparents. But that is only four generations back. Diversity of sex, therefore, becomes a cause of variation. But all variation, says Weismann, occurs in the germ-plasm.

It is denied by Weismann that modifications of the

body of a parent can affect the germ-plasm. It lives a life of absolute seclusion and independence. By the composition of different germ-plasms variation can be caused, but the problem now is to account for the differences in these ancestral germ-plasms. If each individual had an infinite number of ancestors, it might not be impossible to account for variation, but this cannot possibly be the case. Embryology teaches that all animals, including man, have been derived from unicellular organisms. If no acquired characters have been transmitted since the unicellular state was passed, what origin of variations can we have in the union of germ-plasms precisely alike? This difficulty seems to be intensified, if we believe with Weismann that the male and the female germ-plasms are dynamically identical; that is, having no specific function. "But," says Weismann, "we must not look for conspicuous variations — such as occur among domesticated animals and plants — in the process of evolution as it goes on in nature. . . . Let us suppose that it was advantageous to some species — for instance, the ancestors of the giraffe — to lengthen some part of his body, such as the neck: this result could be obtained in a relatively short time, for the members of the species already possessed necks of varying length, and the variations which form the material for natural selection were already

in existence. Now all the organs of every species vary in size, and any one of them will undergo constant and progressive increase, as soon as it acquires exceptional usefulness. But not only will the organ fluctuate as a whole, but also the parts composing it will become larger or smaller under given conditions, will increase or diminish by the operation of natural selection. . . . Fluctuations in the chemical composition of the molecules of a unicellular organism, for example, must continually arise, just as fluctuations are always occurring in the number of pigment granules in a certain cell, or in the number of pigment cells in a certain region of the body, or even in the size of the various parts of the body. . . . If we ask in what lies the cause of variability, the answer must undoubtedly be that it lies in the germ-cells. From the moment when the phenomena which precede segmentation commence in the egg, the exact kind of organism which will be developed is already determined, whether it will be larger or smaller, more like its father or its mother, which of its parts will resemble the one and which the other, even to the minutest detail. . . . If we trace all permanent hereditary variations from generation to generation back to the quantitative variations of the germ, as I have sought to do, the question naturally arises as to the source from which these variations arose in the germ itself.

. . . I believe that they can be referred to the various external influences to which the germ is exposed before the commencement of embryonic development." It is here that Weismann finds his chief difficulty, and feels himself required to make considerable retraction from his doctrine of "the seclusion of the germ-plasm," for he goes on to say: "Hence, we may fairly attribute to the adult organism influences which determine the phyletic (or race) development of its descendants. For the germ-cells are contained in the organism, and the external influences which affect them *are intimately connected with the state of the organism in which they lie hid.* If it be well nourished, the germ-cells will have abundant nutriment; and, conversely, if it be weak and sickly, the germ-cells will be arrested in their growth. It is even possible that the effects of these influences may be more specialised; that is to say, *they may act only upon certain parts* of the germ-cells. But this is, indeed, very different from believing that the changes of the organism which result from external stimuli can be transmitted to the germ-cells, and will redevelop in the next generation at the same time as that at which they arose in the parent, and in the same part of the organism."[1]

Thus it seems that Weismann does admit that

[1] August Weismann, *Essays upon Heredity*, pp. 101, 104.

variations arise in the germ-plasm from causes outside of itself. These causes act upon it while in the parental body and must, therefore, be operative through the body. The great question is, how extensive may be the effects produced upon the germ-plasm, which thus become inheritable? If it is affected at all, and Weismann admits that it is affected, the extent of the effects that may be produced upon the germ-plasm must be measured by the evidence. We must remember that this doctrine of the germ-plasm is itself purely theoretical. It is not positively known whether the reproductive cells are all handed over, as Weismann's hypothesis affirms, from an ancestral organism, or are produced by the organism itself, as the hypothesis of pangenesis represents. But, admitting the theory of the continuity of the germ-plasm, we may inquire how extensively it is affected by the body in which it resides. Nor should we be prejudiced against good evidence for the direct inheritance of acquired characters by Weismann's views; for, in the first place, the presumption against such inheritance is only theoretical, and, in the second place, Weismann's rejection of it is largely polemical. As J. Arthur Thomson has pointed out, "the organism is a unity; cell is often linked to cell by bridges of living matter; the blood is a common medium carrying food and waste; nervous relations

bind the whole in harmony. Would it not be a physiological miracle if the reproductive cells led a charmed life unaffected even by influences which touch the very heart of the organism? Is it unreasonable to presume that *some* influences of habit and conditions, of training and control, saturate the organism thoroughly enough to affect every part of it?"[1]

Eimer's Criticism of Weismann.

A distinguished German naturalist, G. H. Eimer, bases his whole conception of evolution upon the inheritance of acquired characters. His translator, J. T. Cunningham, of Oxford, says: "The fact that artificial malformations are not usually inherited is no argument against the inheritance of acquired characters. In all animals, from the lowest up to reptiles, recrescence of lost parts takes place, and the reappearance of lost parts in the next generation in mammals and birds seems to me to be simply recrescence slightly postponed." It is further argued that, although language is not directly inherited, the organic structure, including the cerebral centres of control over the organs of speech and a predisposition to speak, is inherited, by the human child, but not by other mammals. But this structure has been

[1] J. Arthur Thomson, *The Study of Animal Life*, pp. 334, 335.

somehow acquired in the process of evolution and has been acquired gradually. It must, therefore, have been developed through the inheritance of acquired characters. The same is true of an "ear for music." "It may be said that the necks of the giraffe's ancestors were of different lengths," continues Cunningham, "and the selection of the longest produced the striking length of neck we now see. But how can it be said that the horns of ruminants arose? No other mammals have ever been stated to possess two little symmetrical excrescences on their frontal bones as an occasional variation. What then caused such excrescences to appear in the ancestors of horned ruminants? Butting with the forehead would produce them, and no other cause can be suggested that would."[1]

Against Weismann's conception of the isolation of the germ-plasm, and its importance in heredity, are to be set the following facts: "It is known that even highly organised animals and plants have the power of multiplying, by simple division in the case of the former, by cuttings in that of the latter. The new complete individual produced by this method has the same characters as the animal or plant produced at another time from a germ-cell — a proof that the substance possessing the property of heredity

[1] G. H. Eimer, *Organic Evolution*, p. 11.

is not confined to the germ-plasm, and that it cannot be something altogether different from other parts of the organism."[1] It is thus evident that other parts of the body, as well as the germ-plasm, may send off reproductive elements. "The germ-plasm cannot possibly, in my view," continues Eimer, "remain untouched by the influences which are at work on the whole organism during life. Such an immunity would be a physiological miracle, merely on account of the morphological relations of the animal ovum and spermatozoön, and their dependence on the nutritive processes of the body, — a miracle which would be no less inexplicable than atavism, apart from Weismann's theory, seems to be."[2] As regards mutilations, Eimer says: "That injuries incurred during life are but seldom transmitted to the offspring does not appear to me wonderful; the inheritance of the complete form and complete activities of the organism, which took root such enormously long periods ago, and has been strengthened at each generation, will as a rule counterbalance in the offspring any such injuries incurred only once and not repeated. It is true, there are injuries which, although they have always been repeated constantly, are yet never inherited. Among these is the rupture of the hymen in women." Eimer emphasises the

[1] G. H. Eimer, *Organic Evolution*, p. 12. [2] *Id.* p. 12.

point that "sexual differentiation itself is at first an acquired character." He also indicates the influence which a slight variation may have upon the entire organism. "As soon as something or other in the original state, in the original arrangement of the parts of the organism, is changed, other parts also are set in motion, all arranges itself into a new whole, becomes, or forms, a new species, — just as in a kaleidoscope, as soon as on turning it one particle falls, the others also are disturbed and arrange themselves in a new figure — as it were re-crystallise."[1] It is impossible, upon Weismann's theory, to account for the striping of the surface of animals, for the germ-plasm is not exposed to any alternation of light and shade which would govern the deposition of pigment. "Cross-marking is perhaps to be connected with the shadows, for example, of the branches of woody-plants — thus the marking of the wild-cat escapes notice among the branches of the trees. Others have suggested such relations as that of the cross-striping of the tiger with the shadows of the bamboos in which it lives." Here would be a variation useful in concealing the animal upon which natural selection might act. The extent of influence upon the germ-plasm, if its importance be conceded, must evidently be greater than Weismann admits.

[1] G. H. Eimer, *Organic Evolution*, p. 13.

Inheritance of Acquired Characters.

The existence of rudimentary organs is difficult to explain except on the hypothesis of atrophy from disuse. If the germ-plasm were not affected in some way through the body, in which alone it is capable of diminished function, a disused organ should go on reproducing itself without ever becoming vestigial. The inheritance of syphilis, alcoholism, and other hereditary diseases, is inexplicable except on the supposition that the poison is conveyed to the reproductive elements. According to Darwin, the families of drunkards become extinct in the fourth generation. It has been established by Ruer and Demeaux, that the children of usually temperate parents whose generation has occurred during a period of intoxication have in a high degree a tendency to mental derangement and mental disease. This shows that a single drunken debauch may seriously affect the reproductive elements. There is also a marked difference in children according to the time of life of their parents when they are born. Hereditary senility is not uncommon. It is a striking fact that, according to Marro, nearly fifty-three per cent of all murderers, so far as his tables show, were begotten by fathers who had reached the period of decadence.

Into the fertile field of psychic inheritance, normal and abnormal, it is perhaps best not to enter here. But the modification of instincts is too important a consideration to be passed over in silence. The instincts of animals are so invariable that we calculate upon them with much the same certainty that we do upon the uniformity of physical forces. They, therefore, furnish most satisfactory phenomena for test cases of the inheritance of acquired characters. The bee can be made to substitute pentagonal cells for hexagonal; the beaver can be converted into a miner; migratory swallows remain the whole year in warm countries. Originally, man domesticated animals with great difficulty, because of their strong self-protective instincts, but these are largely lost under prolonged domestication. New instincts are created, displacing the old. At first there is a conflict between the two heredities, the wild and the domesticated, but at last the acquired excludes the primitive. This is wholly inexplicable except upon the assumption that acquired characters are inherited. The ducklings from the eggs of wild ducks immediately take flight on being hatched, while those of tame ducks do not. The foals of circus-ponies are said to be born with a predisposition to the tricks of their parents. Young pointer dogs are said to point the first time they are taken out. Popular evidence of

this kind, however, cannot be greatly insisted upon, because it is often defective in verification.

However difficult it may be to form a satisfactory theory of heredity, the transmission of acquired modifications seems to be evident from the necessary conditions of evolution. Multicellular organisms have arisen by the formation of groups of unicellular organisms, whose constituents were interrelated as a permanent whole and specialised by a division of labour. For example, certain cells in the epiblast, or epidermis, of such a composite organism became specialised into touch-cells. All the higher sense-organs have in turn been developed from touch-cells, as is proved by comparative anatomy. But what is it that specialised these cells? Obviously, reaction upon the stimuli to which they were subjected. The eye as an organ of vision has been developed by a continuous reaction of a group of pigment cells upon light. But, supposing the germ-plasm to be wholly isolated from influence from such specialised organs in the parent, what increment of sight could be gained from generation to generation from the increasing adaptation of the adult organs? Evidently, none. The whole procedure of development implies a connection between the adult organs and the reproductive elements. The brain and nervous system must be regarded as the seat of those complex

reflexes that we call instincts. Instincts are most readily explained as inherited habits. A mode of action become habitual in the parent is automatic in the offspring. As Eimer expresses it: "Brains, or a brain, as the case may be, could only arise in consequence of the fact that certain ectoderm-cells, or groups of such, came more frequently into contact with the outer world, and accumulated experience, or were from their favourable position adapted to form the middle-point for the activities of a larger number of neighbouring cells — cerebral ganglia could only be developed in consequence of the inheritance of acquired characters."[1]

The Beginnings of Life.

So far as structure is concerned, there is no possible explanation of it outside of the interaction of pre-existing resident and incident modes of energy. Every organism, being composed of matter, must find the complete account of its genesis in the properties of its constituents, the action of the environment upon them, and the reaction of the organism itself. But it has been held that, in addition to the physico-chemical agents, there is a superior and independent force called "vital," having the peculiar power of organising, sustaining, and reproducing

[1] G. H. Eimer, *Organic Evolution*, p. 349.

living beings. The reasons given for accepting the existence of this hyperphysical entity, now abandoned by biologists, were the inadequacy of the physico-chemical forces to produce the phenomena of life and the alleged peculiarities of the vital movements.

The inadequacy of the physical and chemical forces to produce the phenomena of life, however, is a purely gratuitous assumption, resting upon the ancient idea that each force is a separate entity, limited to a defined sphere of action. The doctrine of the transformation and conservation of energy has dismissed the idea of such defined forces from all except the most belated minds. It is still said, nevertheless, that if the properties of matter adequately account for life, synthetic chemistry should be able to produce life by a union of its elementary causes. The analytic chemist can name the constituents of protoplasm, the simplest form of living matter, from which all higher forms are derived, but synthetic chemistry is so far unable to produce it in the laboratory. The doctrine of biogenesis, namely, that living beings are, within our experience, derived only by generation from other living beings, is at present universally accepted. We have no example of spontaneous generation, or of the synthetic production of life by the artificial union of the elements

composing living bodies. And yet life certainly had a beginning upon our planet.

The requirements of the case are, however, fully met if we assume that the energy which at the inorganic level displays itself in physico-chemical phenomena advances to a higher stage of expression in organic forms. It does, indeed, require an organific energy to effect organisation; but nothing is gained by invoking a non-resident force for every new phase of development. Whence can such a new force emerge? How, if not allied to pre-existing forces, can it act upon and organise them? Such questions admit of no answer, and merely show the groundlessness of the hypothesis. Physico-chemical energy is constantly being transformed into organic products, and the transforming agency is less readily conceived as an external force descending upon its materials than as a new manifestation of an energy already latent within the materials themselves. A large number of substances formerly believed to be formed by living organisms only can now be synthetically produced by the chemist. And yet there is no intrusion of extra-chemical forces.

All of these new results are found to depend upon a union of conditions not easily attained, but when they are fulfilled the results no longer seem exceptional. Life is at present possible in its most sturdy

representatives only within an exceedingly limited range of conditions. Its origin must have required a still more unusual combination of circumstances. It would not be surprising, therefore, if the chemist should never be able to realise this precise confluence of conditions, for they may be too numerous and too delicate for human control, or it may be impossible for all of them to exist in the present state of our planet. Theoretically, the whole history of organic evolution might be experimentally illustrated by reproducing from a unicellular origin the whole series of organic forms under artificially induced conditions; but, practically, every one sees that it is beyond the power of man to make such an experiment successful. The factor of time would alone render it impossible, but conditions of temperature and environment would prove equally refractory.

As regards the peculiarities of vital movements, it is universally agreed by modern biologists that the most complicated motions of the highest animals, including man, are modified forms of protoplasmic functions. All that is peculiar in vital movements is found in germinal manifestation in protoplasm. This has the power of *assimilation*, that is, of organising non-living matter into its own substance; and *contractility*, that is, the ability to move its parts and put them in new relations to the surrounding me-

dium. But, while the chemist cannot put together inorganic substances so that they will exhibit or acquire these properties of assimilation and contractility, it must be remembered that the living animal itself cannot appropriate inorganic matter and convert it into its own substance. It is dependent upon the preliminary work of the plant, which alone can raise inorganic matter to a condition adapted to animal assimilation. The sequences of natural action adhere so closely to the ordained programme that the slightest change in the order renders the result impossible. The whole animal world would perish were it not for the intermediary office of the plant world in executing the preliminary task of raising inorganic elements to the level of animal assimilation.

In order to trace the path of transition from the state of ordinary chemical reaction to that of protoplasmic function, it would be necessary to know what intermediaries may have existed between these stages in the course of protoplasmic evolution. Of one important fact biologists are now assured, and that is, that protoplasm in the simplest form known to us has had an ancestry, and the successive species intermediate between inorganic elements and any existing plant or animal protoplasm may number hundreds or thousands.

But the peculiar vital movements, assimilation and contractility, even in contemporary protoplasm with all its acquired determinations, the product of long experience, have their analogues in certain purely physico-chemical movements. A few fragments of camphor dropped upon the surface of clean water will begin to move about in an active manner. They spin and dodge and dance like living beings. Particles of gamboge, when rubbed up in water and examined through a microscope, will be seen to move like animalculæ. This is called the "Brownian movement," and is supposed to be caused by temperature changes between the particles and the water. These are examples of different kinds of visible movements which might easily be interpreted as effects of a special force.

There are also molecular movements invisible to our senses but betrayed by new effects. Modern science has discovered that every body has a tendency to act upon surrounding bodies so as to bring them into a condition similar to its own. The space lying about such a body is called its "field." Thus, there are thermal, electrical, magnetic, mechanical, and chemical "fields," or areas of transmitted influence. The movement of vital assimilation may be in reality merely the extension of a vital "field," a transformation of non-living into living matter by

setting up a new molecular activity in the substance assimilated. This may have been originated by the interplay of several thermal and chemical "fields." The conditions for such an interplay may not now be possible, but once acquired, this peculiar "field" may extend itself indefinitely. Thus, in a short time, a quantity of meal, in which a pair of mice have made their residence, will have disappeared as meal but will have reappeared as mice.

Considered merely as a special mode of molecular activity, life is not without analogy with fire. As new combustibles come within its "field," it ignites them and propagates itself. When all the fuel is exhausted the fire dies away, is extinguished, ceases to be. It is a wave of complicated molecular motion rising to its height and receding to the level from which it emerged. Nothing is really destroyed, but much is transformed, and the products of its action are widely different from the original fuel. But the torch of life never goes out. Its perennial flame is passed on from generation to generation. Reproduction is simply growth, or assimilation about new centres. The process is continuous, but the centres of activity are new.

Considered *as movement only*, life is not intrinsically more mysterious than fire, or less subject to universal physico-chemical laws. But there is another attribute

of living beings, or at least of some living beings, of which so far no mention has been made. This is *sensitivity*, which is a universal animal property, but not to be identified with motion. No complexity of motion, so far as we can see, could ever give rise to it; for it belongs to a different category of being. It is not to be studied as an object of sense, for it is not apprehended by any one or all of our senses. It is known in individual consciousness, and is attributed by analogy to other beings whose movements seem to us significant of conscious states. In the passage from objects-of-consciousness to the consciousness-of-objects, therefore, another veil is lifted from the face of Being.

III.

THE GENESIS OF CONSCIOUSNESS.

EVERY known mental manifestation is associated with organic movement, and in man both mind and its expressive activities are centred in the cerebro-spinal portion of the nervous system, and especially in its encephalic ganglia, the brain. This complex and important organ has received within recent years the minute and prolonged attention of investigators both from an anatomical and a physiological point of view. Its topography has been carefully represented by means of accurate charts and models, its histological components have been examined by means of improved methods of section and colouration under microscopes of high power, its functions have been studied in the lower animals by every means at the disposal of science, and in man by post-mortem examination of sound and pathological cases as well as in lesions of the living.

As a result of these investigations, a new and suggestive body of evidence is in existence regarding the

localisation of function. It is found that specific areas, more or less distinctly circumscribed, are specialised for motor and sensor functions, and that each sense has its own appropriate tract of stimulation. It is true that, as early geographers differ in their report of newly discovered countries, investigators in this newly explored territory vary in their results; still, there is a consensus on many important points, and, what is more significant, there is now unanimity among the specialists as regards functional limitation. Interesting as many of the details might be, it is impossible to give even a summary of them in this essay. It is sufficient for our purpose to show the bearing of the facts of localisation of function upon the problem of psychogenesis. The first proposition derived from these facts is, that organic and mental phenomena — or "neurosis" and "psychosis" as they have been called — have common space-relations. The second is, that they are manifested in distinct tracts of organic tissue, and are, therefore, not only correlated generally but specifically in the organism. The third inference is that these specifically correlated psychoses and neuroses result from a differentiation of function that accompanies a differentiation of the tissue in which they have their seat; or, in other words, that, as parts of the brain are developed and adapted to specific uses, the correlated psychic mani-

festations, although not identical either with their substance or their activities, are also developed and adapted in a corresponding manner.

Unconscious Cerebration.

While it may be said that every psychosis is accompanied by a correlated neurosis, it cannot be maintained that every neural change is attended with consciousness. Unconscious cerebration occurs in which very complicated acts, including those, perhaps, of ideation, are perfectly performed. It is now established that the paths of reflex action, traversed by external stimuli reappearing as motions, are continuous; that is, that the afferent nerves terminate in ganglia whence originate the efferent nerves by which the muscles are set in motion. This statement is subject, however, to the qualification that no nerve seems to be strictly continuous, but to consist in a series of elements through which motion has continuity. The in-carrying and out-carrying tracts of nerves are so woven into a complex central network that stimulus may traverse the whole system. The central connections may be so traversed as to produce an exceedingly complicated series of outward movements, as in the feats of somnambulists, or the still more wonderful performances of hypnotic subjects, without any trace being left in the memory

of the conscious subject, and probably without any accompaniment of consciousness at the time of the action. It is even conceivable, — so large is the provision for automatism in the nervous system of man, — that a person might live for months, or even years, in a perfectly unconscious condition, the bodily organism answering periodically to the sense-stimulations entering and producing movements along the pre-established lines of least resistance ordained by previous habit, and causing such actions as those of eating, drinking, turning, rising, and perhaps even those of walking. These considerations have led certain writers to regard consciousness as an "epiphenomenon," a kind of appendix to the book of life added to the completed volume, a sort of afterthought suggested too late for insertion in the text. Perhaps, however, we might find a deeper truth in the allegory if we should say that consciousness is a generously devised epitome in which the great argument of the book is briefly summarised.

The Physiological Conditions of Consciousness.

If only *some* neural changes are attended with consciousness, it is necessary to ask under what conditions it arises. Richet[1] enumerates the following physiological conditions of consciousness: —

[1] Richet, *Psychologie Générale*, p. 31.

(1) *Circulation of the blood.* The cessation or interruption of the circulation is followed by a syncope of consciousness. A moment's pressure of the great arteries supplying blood to the brain renders the subject unconscious.

(2) *Respiration.* The psychic effects of asphyxia are well known. At the end of the first instant, there is an increasing distress. At the end of the second, an intense pain supervenes with suffocation accompanied by convulsive and epileptiform movements. In the midst of this overwhelming agitation intelligence remains unmodified. But soon external objects are no longer perceived; vision is disturbed, ideas become more and more confused, then consciousness is lost. The convulsive reflex movements still continue, but become less and less frequent, and at the end of the fourth instant they also cease.

(3) *Nutrition.* The cerebral cells are renewed by the aliment contained in the blood. Hunger and thirst are psychic notifications of its changed condition. Although consciousness continues long after the supply of aliment has been withdrawn, delirium at last sets in, ideas become incoherent, sensibility is modified, and at last death ensues. It seems as if the separate centres, and even the separate cells have a life of their own which endures after the bond that unites them in rational co-ordination has been broken.

(4) *Temperature.* Consciousness is manifested only within certain very narrow limits of heat. For the warm-blooded animals the normal temperature of the blood does not vary much. For man it is about 98½° F. At a few degrees above this, delirium appears, and, if the temperature still rises, consciousness is soon lost. Excepting in the hibernating animals, which endure a low degree of cold, still not without the loss of consciousness, life itself ceases when the temperature of the blood falls much below the normal. But long before life becomes extinct, consciousness disappears, and all spontaneous movements cease.

(5) *Age.* All living tissues are subject to a common law. They are born, grow old, and die. This process is constantly going on in every living man. The nervous tissues are no exception. The brain, like a tree withered at the top, may lose its vitality long before the other parts of the organism have yielded to the law of death. Or it may put forth its signs of vitality when trunk and roots give no promise of longer life, like the pine-tree whose evergreens wave triumphantly in the breeze above the scars of the lightning's stroke.

(6) *Sleep.* One of the conditions of the activity of the nervous system is the intermittence of its action. No living creature can continue always

awake. Sleep is the universally necessary period of repose and rehabilitation. It is a question whether, viewed from its psychic side, it implies the abolition or only the diminution of consciousness. Locke maintained the former, Hamilton the latter thesis. The truth probably is, that consciousness may be represented under the similitude of a conical figure. To be wide awake, is to be aware of all that can be embraced by its largest circumference, the base; to be fast asleep, is to be aware of nothing, or the contents of its smallest circumference,—really a circumference no longer, except by courtesy, — the point which constitutes its apex. Between these extremes there is room for every possible degree of consciousness, as testified to by the personal experience of various witnesses. But all testimony upon the continuity of consciousness is subject to the important qualification that, if there were a lapse of consciousness for a period of any length whatever, it would not be an element of conscious memory. In cases of syncope, the thread of conscious experience is resumed exactly where it was broken off, so that a sentence, begun before a railroad accident, has been completed weeks after its occurrence, the injured person in the meantime lying apparently lifeless in a hospital. That some persons believe themselves to be continuously conscious, even during sleep, is,

therefore, a fact easily explained. It seems paradoxical to say that we are conscious of our unconsciousness, but this is not the position of him who denies continuity so much as of him who assumes that if we were unconscious we would be conscious of it. We must conclude that, although insomnia may be protracted in abnormal cases, it is never manifested in normal experience as a strictly continuous consciousness, and even in abnormal cases is by no means so complete as the patient fancies.

The foregoing are the leading physiological conditions of consciousness. It needs only to be added that the integrity of the cerebral organ in general is essential for normal consciousness. Whatever tends to destroy this, whether the agent be toxic, or mechanical, disturbs the unity and harmony of the psychic life, and, if carried to an extreme, ends in the cessation of consciousness altogether, so far as objective tests can determine.

The Identification of Consciousness and Motion.

So far our inquiry has developed only negative results, showing the limits beyond which consciousness is not manifested. This is far from being what we require for a positive explanation of psychic phenomena. Hertzen,[1] of Lausanne, has endeavoured to

[1] Hertzen, *Grundlinien einer allgemeinen Psychologie*, pp. 100, 101.

present the positive condition of consciousness. He says: "Consciousness is connected exclusively with the *disintegrating* phase of central nervous action." He offers the following laws of relation: (1) "The intensity of consciousness is in *direct* ratio to the intensity of functional disintegration." (2) "The intensity of consciousness is in *inverse* ratio to the ease and quickness of the central translation of stimulus into action." This last corresponds to the diminishing sensibility in the growth of habit, or the law of increasing automatism. What we do easily and quickly we soon do unconsciously. Thus, we learn to walk, to read, to spell, to write, with a minimum of consciousness. A transaction that is difficult and new gives us much thought, perhaps worry, a feeling of resistance among our ideas corresponding to the disintegration of cerebral tissue noted by the physician in the copious waste products eliminated from the body.

But precisely what this metabolism is by which the disintegration of cerebral tissue becomes the condition of consciousness Hertzen is far from disclosing. He identifies psychic activity with motion, — the molecular motion produced by the decomposition of nerve-cells. He says: "We may liken the brain to a hall provided with a multitude of gas-lights, but illuminated by only a relatively constant

number of burning jets, which, however, are not always the same; on the contrary, they change every instant: as some are extinguished, others are lighted; all are never lighted together; from time to time all are dark."[1] Just as light is a mode of motion, this writer maintains, so also is consciousness. We may not be able to display to the eye the configurations that represent its varied phases, but it may be proved, he thinks, that consciousness is a mode of motion; and, having done this, having co-ordinated it with light, heat, electricity, and the other molecular forces, we are no more required to show what kind of a motion corresponds to love and what to hate, for example, than to describe the form of a wave of red light or construct a diagram exhibiting the secret of electrical action.

All this must be conceded if it can really be proved that consciousness is simply a mode of motion. The proofs of it, according to Hertzen, are both indirect and direct. The indirect proof is, that, as motion is for us a series of changing sensations, these sensations can be nothing else than motion. The direct proof is, that all our states of consciousness have a measurable duration and every psychic act has a time-relation. But every process that has duration can be nothing else than motion.

[1] Hertzen, *Grundlinien einer allgemeinen Psychologie*, p. 98.

Therefore every psychic activity must be a motion, and consciousness is the sum of these activities.

We may well regard this facile resolution of consciousness into motion with serious reserve. This simple solution of the problem succeeds only by ignoring the central difficulty, — the translation of objects-of-consciousness into consciousness-of-objects. Motion is, indeed, known to us as a relation of change among our objects-of-consciousness, but this does not justify us in affirming that consciousness-of-objects is also motion. The duration of mental states, it is true, implies the existence of motion as the measure of that duration, that is, in the neurosis to which the psychosis corresponds. But Hertzen's explanation identifies neurosis and psychosis, for he says that the consciousness-of-motion is simply that motion which he calls consciousness. This identifies subject and object as absolutely as Hegel did, and resolves all being into thought.

It may be said, however, that Hertzen identifies consciousness with a particular kind of motion, but this is to exclude the knowledge of any other kind; for the consciousness-of-motion being simply the motion-of-consciousness, only the motion-of-consciousness is in the field. This turns out to be a very old-fashioned solution of the problem, for it is nothing else than subjective idealism in a new guise. We

know objects because we are those objects. "Motion" is used as a convenient middle term for the unification of the consciousness-of-motion with consciousness itself. To recur to Hertzen's comparison of the brain to a hall with a multitude of gas-lights, we may say that each light, if its molecular motion were of the kind that is identical with consciousness, would simply be conscious of itself, not of the other lights. If molecular motions in the brain are identical with consciousness, they also would be conscious of themselves, but not of one another or of anything else. There would still be wanting a being that could know and compare them together. But such a being, possessing a consciousness-of-objects, would be other than the objects-of-consciousness.

The Psychic Life of Micro-organisms.

We may find some aid in comprehending the origin of psychic phenomena by an examination of their simplest forms and lowest terms. In adult man they are exhibited in their greatest complexity. In the child they are more rudimentary, but still they are highly complex. No period of human infancy discloses their simplest forms. We cannot trace their development from the embryonic stage. But we can follow the thread of analogy suggested by embryology. Every human child, on the physical

side, is developed from a pair of unicellular organisms, one of which seems to have no other part to perform than to quicken the development of the other in certain specific ways. What, then, are the psychic manifestations of unicellular beings? The question may seem to be a vain one, but Binet has undertaken to answer it.

Before we pass on to state some of the results of observation upon these infinitesimal beings, it may be well to point out the difficulties that have arisen from the supposition that living cells are wholly devoid of psychic life. Herbert Spencer, in his synthetic philosophy, has undertaken to unify our knowledge by analytically reducing conscious experience to its lowest terms and then building up synthetically an explanation of this experience. The lowest terms of consciousness he finds in sensation. But he begins his synthesis, not with sensations, as we might naturally expect, but with reflex actions primarily devoid of sensation. This inconsistency has led Siciliani, the Italian anthropologist, to ask, "Why, after having arrived by the process of analysis at the elementary form of perception, that of difference, do you stop there; while you rise by the process of synthesis from reflex action as a point of departure? Why, in a word, does analytical psychology arrive at a conscious act, however rudi-

mentary, while synthetic psychology starts from an unconscious and automatic activity?"[1] This is a pertinent criticism, which applies equally to Romanes's endeavour to trace the evolution of psychic phenomena, since he denies them altogether to the lowest beings in the zoölogical series, and marks their appearance, one after another, in the ascending scale of life, in what seems a very arbitrary manner.

The thesis of Binet supplies Spencer and Romanes with a more satisfactory starting-point. Binet maintains "that, in these simplest forms of life, the protoorganisms, we find manifestations of an intelligence which greatly transcends the phenomena of cellular irritability. Even on the very lowest rounds of the ladder of life, psychic manifestations," he says, "are very much more complex than is believed."[2] The lowest form of protozoön known to us is the Amœba. It appears to be a simple undifferentiated protoplasmic cell. "The following," says Binet, "is what occurs when the Amœba, in its rampart course, happens to meet a foreign body. In the first place, if the foreign particle is not a nutritive substance, if it be gravel for instance, the Amœba does not ingest it; it thrusts it back with its pseudopodia. This little performance is very significant; for it proves

[1] Siciliani, *Psychogénie Moderne*, p. 84.

[2] Binet, *The Psychic Life of Micro-organisms*, p. 3.

that this microscopic cellule in some manner or other knows how to choose and distinguish alimentary substances from inert particles of sand. If the foreign substance can serve as nutriment, the Amœba engulfs it by a very simple process. Under the influence of the irritation caused by the foreign particle, the soft and viscous protoplasm of the Amœba projects itself forwards and spreads about the alimentary particle somewhat as an ocean-wave curves and breaks upon the beach; to carry out the simile that so well represents the process, this wave of protoplasm retreats, carrying with it the foreign body which it has encompassed. It is in this manner that the food is enveloped and introduced into the protoplasm; there it is digested and assimilated, disappearing slowly."[1] Binet adds: "In a large number of species the prehension of food is preceded by another stage, the search for food, and in the case of living prey, by its capture."

We shall not consider these phenomena among all the Protozoa, but shall direct our attention especially to the ciliated Infusoria. Their habits are a remarkable study. "If a drop of water containing Infusoria be placed under the microscope, organisms are seen swimming rapidly about and traversing the liquid medium in which they are in every direction.

[1] Binet, *The Psychic Life of Micro-organisms*, p. 41.

Their movements are not simple; the Infusory guides itself while swimming about; it avoids obstacles; often it undertakes to force them aside; its movements seem to be designed to effect an end, which in most instances is the search for food; it approaches certain particles suspended in the liquid, it feels them with its cilia, it goes away and returns, all the while describing a zigzag course similar to the paths of captive fish in an aquarium; this latter comparison naturally occurs to the mind. In short, the act of locomotion, as seen in detached Infusoria, exhibits all the marks of voluntary movement."[1]

With one more short extract I shall conclude my citations. "There exist organisms which lead a life of habitual isolation but which understand how to unite for the purpose of attacking prey at the desired time, thus profiting by the superiority of numbers. The *Bodo caudatus* is a voracious Flagellate possessed of extraordinary audacity; it combines in troops to attack animalculæ one hundred times as large as itself, as the Colpods for instance, which are veritable giants when placed alongside of the Bodo. Like a horse attacked by a pack of wolves, the Colpod is soon rendered powerless; twenty, thirty, forty Bodos throw themselves upon him, eviscerate him and devour him completely."[2] As a result of his

[1] Binet, *The Psychic Life of Micro-organisms*, p. 46. [2] *Id.* p. 60.

investigations, Binet enumerates the following traits in these micro-organisms: (1) the perception of the external object; (2) the choice made between a number of objects; (3) the perception of their position in space; and (4) movements calculated either to approach the body and seize it or to flee from it.

Organic and Functional Development.

Thus we seem to find psychic phenomena associated with unicellular beings at the very basis of organic life. Lower we cannot go. We find a sense-of-objects even in proto-organisms. Metazoa are apparently developed from these Protozoa. First they exist in colonies, each individual of which is like every other; then in colonies whose members perform specific functions; finally in correlative organs in which the separate cells have been widely differentiated into bone, muscle, nerve, or other tissues, each group specialised to the performance of a single function, the whole federated into an organism whose intricacy is so great and whose components are so numerous that it has been only quite lately discovered that the human body, in common with every animal body, is built up of these living aggregates.

But in this highly developed product we do not find evidence that the psychic phenomena of proto-

organisms are displayed by all the constituent cells. In the process of specialisation certain functions have been delegated to particular groups of cells. Those of the nervous system have assumed and discharge the functions with which psychic phenomena are associated. As the single original row of nervous cells developed into a spinal cord, the psychic manifestations were handed over to that. As the spinal cord developed greater ganglia at one of its extremities, the more important of the psychic manifestations were passed on to these superior ganglia. Out of these developed the hind-brain, the mid-brain, the fore-brain, the total cerebrum in man, so that, as Goethe guessed, the skull is only the greatest of the vertebræ, and to the cellular contents of this crowning structure were at last transferred those neuroses which accompany human consciousness.

Consciousness is never strictly simple. Its very name implies the apprehension of at least two elements which are known together. The very essence of intellect is discrimination. But this proceeds to no great length without assimilation, that is, the apprehension of similarity. The whole fabric of knowledge consists in the sum of apprehended resemblances and differences. All thought is unification or differentiation. Its materials lie in the objects of consciousness. Its process consists in the conscious-

ness of likeness and difference. Its laws are reducible to the principles of identity, contradiction, and excluded middle, defined in the works on logic.

What we call "reason" is the unity which harmonises diversity. Its categories are at once the forms of thoughts and of things, for otherwise thought and its objects would have no common bond, and reason would know no necessity. Consciousness is the common bond of the senses. There may be sense-presentations without it, although the philosopher is not in a condition to experience them. A dog, a portion of whose cerebrum has been removed, may be excited by the presence of food; but he cannot co-ordinate his sense-presentations. We may say that he is without consciousness. Consciousness is the string upon which the pearls of sense are strung. Break the string, and the pearls are scattered, but they do not cease to be. The string is broken when the co-ordinating centres in the brain are rendered inoperative by any cause. These centres are called the "seat" of consciousness. Still, we may not say that their movements are consciousness. Consciousness is that psychosis in which other psychoses are unified.

It has, indeed, been questioned whether or not there may be a spinal consciousness as well as a cerebral consciousness. It is not improbable that this exists in those creatures that are not provided with a

brain. It appears, however, that the "seat" of consciousness is always the higher co-ordinating centre, and that, in the process of development, this is transferred to successively added increments of the evolving organism. If this be true, in man the inferior centres of the nervous system have been made the unconscious mechanism through which reflex and voluntary actions are mediated, while consciousness, in its full-orbed splendour, is possible only in the superior regions of the brain.

The Dissolution of Personality.

Recent investigations have made it appear probable that there may be more than one consciousness in the same brain. Ribot[1] enumerates the types of what may be called the dissolution of personality, or the disruption of the unity of consciousness. They are as follows: —

(1) Alienation, in which the consciousness of the body is completely changed. A new state serves as the basis of a new psychic life, or manner of feeling, perceiving, and thinking, whence results a new memory. The old life is reduced to an almost unconscious state, and becomes to the new consciousness an "alien," a stranger, whom the new person does not even know.

[1] Ribot, *Les Maladies de la Personnalité*, pp. 137, 151.

(2) The second type is characterised by an alternation of two personalities, sometimes designated as "double consciousness." The two personalities are often completely ignorant of each other. The periods of the domination of each phase of consciousness vary in duration, but alternate at intervals, sometimes fixed and sometimes not. The phenomena resemble what we might expect if two souls dwelt in one body with alternating mastery, and in earlier times such cases were interpreted as the obsession of superhuman beings. It is as if two different foci in the brain alternately became the points at which the mental life is converged and unified, each point of view wholly excluding all the mental scenery of the other.

(3) The third type is more superficial and creates no absolute break of memory. It consists in a substitution of one personality for another, as when a man regards himself as a woman, or a labourer declares himself to be a king. This seems to be the concomitant of the hypertrophy of a fixed idea, a conception become so ineradicable that it cannot be co-ordinated with the normal psychic life. It appears that this aberration of consciousness is often only functional, not strictly organic, for hypnotised subjects can be made to change sex, or behave like persons other than themselves by mere suggestion. It is certain, however, that even suggestion is corre-

lated with a neurosis that enters into the general web of neural change, for a person directed in the hypnotic state to perform a certain act, — even an extraordinary, an absurd, or a criminal act, — will execute it at the proper time. The subject has no conscious recollection of the suggestion and often endeavours to account for this suggested performance as having some connection with his natural course of thought.

Recapitulation of Results.

Let us now summarise the results thus far obtained and try to interpret their signification. We started with the antithesis of objects-of-consciousness and consciousness-of-objects, which we represented by the terms "neurosis" and "psychosis." We found that these antithetical terms embody a distinction that creates the problem of psychogenesis. We traced the progress that has been made in the localisation of psychoses in the brain with whose neuroses they are connected as concomitants. We saw that not all, but only some, neuroses are attended with consciousness. We then examined the limits within which consciousness is manifested, as indicated by the physiological effects of circulation, respiration, nutrition, temperature, age, and sleep. We next discussed the dependence of consciousness upon the disintegra-

tion of brain tissue and the hypothesis that it is simply a mode of motion, which we were compelled to reject. We then followed the indications of embryology, and considered the manifestations of psychic life in micro-organisms. We found that there is a sense-of-objects even in the lowest of these. We called attention to the fact that consciousness is the sense of unity of psychic elements, supported by the unity of the organism, and illustrated it by showing that there are three ways in which this unity may be lost, so that a new consciousness supervenes.

The conclusion from all this evidently is, that, while psychic elements are manifested to us directly only through consciousness, they exist as its pre-conditions; and, therefore, are not to be denied existence beyond the sphere of consciousness. This sense of unity does, indeed, come and go with our food and breath, and, so far as our senses are concerned, ceases when we sleep and when we die, for as an ancient sage has said, "Sleep is the image of death." But while we sleep the psychic elements that consciousness unifies in our waking hours do not cease to be. Who shall say that they shall cease to be in that last sleep whose morning never dawns on earthly hills? Unconscious we were born into this world, and its pain and chill were our first greeting. Unconscious ante-natal elements were the fountain from

whose secret springs personality emerged with its rational powers and ancestral similitude. Either a miracle is wrought with every first sensation, breaking the sequence of causation that connects child with parent, or the promise and potency of a human spirit were centred in the embryonic organism. Unless every analogy of nature is violated, what we call the "soul" had its being long before it came to consciousness.

The Belief in Metempsychosis.

It may be, that this is the truth that underlies the ancient doctrine of pre-existence and metempsychosis. It is almost startling to observe the extent to which this doctrine has been accepted. In a recent essay upon the subject, Professor Knight, of St. Andrews, says: "It has lain at the heart of all Indian speculation on the subject, time out of mind. It is one of the cardinal doctrines of the Vedas, and one of the roots of Buddhist belief. The ancient Egyptians held it. It is prominent in their great classic, *The Book of the Dead*. In Persia it coloured the whole stream of Zoroastrian thought. The Magi taught it. The Jews brought it with them from the captivity in Babylon. Many of the Essenes and Pharisees held it. Though foreign to the genius both of Judaism and Christianity, it has had its advocates (as Delitzsch

puts it) as well in the synagogue as in the church. The Cabbala teaches it emphatically. The Apocrypha sanctions it, and it is to be found scattered throughout the Talmud. In Greece, Pythagoras proclaimed it, receiving the hint probably both from Egypt and the East; Empedocles taught it; Plato worked it out elaborately, not as a mythical doctrine embodying a moral truth, but as a philosophical theory or conviction. It passed over into the Neo-Platonic School at Alexandria. Philo held it. Plotinus and Porphyry in the third century, Jamblicus in the fourth, Hierocles and Proclus in the fifth, all advocated it in various ways; and an important modification of the Platonic doctrine took place amongst the Alexandrians when Porphyry limited the range of metempsychosis, denying that the souls of men ever passed downwards to a lower than the human state. Many of the fathers of the Christian Church espoused it, notably Origen. It was one of the Gnostic doctrines. The Manichæans received it, with much else, from their Zoroastrian predecessors. It was held by Nemesius, who emphatically declares that all the Greeks who believed in immortality believed also in metempsychosis. There are hints of it in Boethius. Though condemned, in its Origenistic form by the Council of Constantinople in 551, it passed along the stream of Christian theology, and reappeared amongst the

Scholastics in Erigena and Bonaventura. It was defended with much learning and acuteness by several of the Cambridge Platonists, especially by Henry More. Glanvill devotes a curious treatise to it, the *Lux Orientalis*. English clergy and Irish bishops were found ready to espouse it. Many English poets, from Henry Vaughan to Wordsworth, praise it. It appealed to Hume as more rational than the rival theories of creationism and traducianism. It has points of contact with the anthropology of Kant and Schelling. . . . Passing from the schools to the instinctive ideas of primitive men, or the conceptions now entertained by races half-civilised or wholly barbarous, a belief in transmigration will be found to be almost universal. It is interwoven with nearly all the mythology of the world. It appears in Mexico and Thibet, amongst negroes and the Hawaiian Islanders. It comes down from the Druids of ancient Gaul to the Tasmanians of to-day. The stream of opinion, whether instinctive, mystic, or rational, is continuous and broad; and if we could legitimately determine any question of belief by the number of its adherents, the *quod semper*, *quod ubique*, *quod ab omnibus*, would apply to this more fitly than to any other." [1]

[1] William Knight, *Essays in Philosophy*, pp. 323, 326.

The Theory of "Metakinesis."

But we cannot terminate our inquiry by the acceptance of this ancient doctrine of pre-existence and transmigration. This is as much a matter of speculation as any other theory, and is attended with embarrassments of a peculiar nature. It is cited to show how strong the conviction of men in all times has been that the mind of man neither arises as an uncaused phenomenon nor finds its cause in the movements of matter. A scientific writer of highly accredited authority, Professor Lloyd Morgan, of Bristol, has stated a theory which does justice to the principle of causation, whatever may be said of it from other points of view.

"It is generally admitted," he says, "that physical phenomena, including those which we call physiological, can be explained (or are explicable) in terms of energy. It is also generally admitted that consciousness is something distinct from, nay, belonging to a wholly different phenomenal order from, energy. And it is further generally admitted that consciousness is nevertheless in some way closely, if not indissolubly, associated with special manifestations of energy in the nerve-centres of the brain. Now, we call manifestations of energy 'kinetic' manifestations, and we use the term 'kinesis' for physical manifesta-

tions of this order. Similarly, we may call concomitant manifestations of the mental or conscious order 'metakinetic,' and may use the term 'metakinesis' for all manifestations belonging to this phenomenal order. According to the monistic hypothesis, *every mode of kinesis has its concomitant mode of metakinesis, and when the kinetic manifestations assume the form of the molecular processes in the human brain, the metakinetic manifestations assume the form of human consciousness.* All matter is not conscious, because consciousness is the metakinetic concomitant of a highly specialised order of kinesis. But every kinesis has an associated metakinesis; and *parallel to the evolution of organic and neural kinesis there has been an evolution of metakinetic manifestations culminating in conscious thought.*" [1]

This doctrine may be restated in other terms as follows: — Being is essentially one, but has two aspects: one of these is known to us as physical action (kinesis) and may be represented by the convex side of a curve; the other is known as a psychical concomitant (metakinesis) and may be represented by the concave side of the curve. Neither can exist without the other, as a line cannot be convex on one side without being concave on the other. They are correlated aspects of the same reality. At the lower

[1] C. Lloyd Morgan, *Animal Life and Intelligence*, p. 467.

stages of development, this reality does not manifest to us its psychic side, because that can be known only to a subject, that is, to a being in whom the psychic elements are converged and unified in a consciousness. But at that level of development where the psychic aspects of being are converged into the unity of a consciousness, the psychic side becomes directly known. But it is never known except subjectively. The psychic life of other men can be known to us only through expressive movements of voice, gesture, and significant signs. The only mind that any man can know is strictly his own mind. All else is inference. But it is necessary inference, for we also convey our ideas through these same media, and can explain the responses we receive only on the supposition that thought answers to thought and feeling to feeling. The genesis of a personal being consists, then, not in the transmutation of physical force into psychic states, as materialism represents, but in the concentration and unification of pre-existing psychic elements, which in their isolation are unconscious, into a conscious individual. Now my thesis is simply this:—

Consciousness is a complex phenomenon, not a simple state. It is made up of elements or factors which *become* consciousness in their union, but are *not* consciousness in their isolation. A single ray of light

does not produce a visual image, but a great number of rays of light, arranged in a given order, do produce such an image. In like manner, the psychic aspect of a single brain-cell is not a consciousness, but the psychic aspects of a great many cerebral cells unified through the organic unity of an organised brain, become a consciousness. This is accomplished through the biological processes which build up the living organism. The whole significance of a nervous system consists in this, that it focusses energy in such a manner that its psychic concomitants acquire unity. The incarrying nerves furnish appropriate conductors for those modes of molecular energy which stimulate the several senses; so that light, sound, and impact are brought to consciousness at the centres where they are converged. Thus man becomes a microcosm in which the extended world mirrors itself, within the limits which are set by his present constitution. Thus also he becomes not only the interpreter, but the interpretation of the world.

Monistic Realism.

The materialistic view, that matter becomes conscious without containing psychic elements, is an assumption without proof and without logical consistency. The idealistic view, that the world of objects

is simply a fiction of conscious mind, is equally devoid of proof and probability. But the crucial question is, what assumption is most harmonious with the whole body of facts? If we carry back beyond the threshold of verifiable knowledge the same ideas of causation, order, continuity, and development which dominate in the realm of inductive science, we find it impossible ever to lose the conception of being, or to reduce it to that of non-being, or to eliminate from it the idea of energy on the one hand and intelligence on the other. If our thought ever obtains a resting-place without violating the laws of thought, it must be in the ultimate idea of One Self-existing Reality, the primal fountain whence all multiform and dependent beings have their source.

This is a conclusion which forces itself upon the naturalist more readily than it does upon the speculative thinker. Professor Nathaniel S. Shaler, of Harvard University, has thus stated the grounds of this growing conviction: — "Until the phenomena of inheritance were in a measure appreciated, biologists generally considered psychic action to be a mere function of the nervous system and to owe its manifestations to some peculiarity in the structure of that organic part. They regarded the mind of man as a direct product of the brain, and explained the coincidences which we find among all

the individuals of a kind as fully accounted for by the likeness in the machinery of this great nerve centre. With this assumption, it seemed a relatively simple and direct conclusion that the mental qualities could be accounted for by the nature of the mechanism which produced them. It was, therefore, only necessary to explain the uniformity in structure of the cerebral parts in order sufficiently to explain the origin of the likeness of the mental phenomena in man or any species of animal; they had but to suppose a law enforcing the shape of those parts to account for the uniformity of the product. . . .

"The facts already ascertained concerning the conditions of inheritance, although they are only a small part of what we have to learn in the matter, show us clearly that the ancient apparently simple explanation of mental phenomena can no longer be safely trusted. If a mechanical explanation can be used at all, it must be vastly more complicated than that which has been hitherto adduced. It is clear that all the essential qualities of the mind pass from generation to generation over the reproductive bridge, borne onward in the keeping of chemical molecules. . . . If there be any organisation of these molecules other than that of a purely chemical kind, the fact entirely escapes our apprehension. It

is, moreover, in a high degree improbable that any such unseen shaping actually occurs. We are thus forced to the conclusion that the ongoing of life from generation to generation is brought about in large measure by influences which may be given over for transmission to the simpler aggregates of matter. We have to suppose that these associations of atoms, . . . which are the units of the protoplasmic mass, can effectively contain and transmit the important elements of experience acquired by myriads of ancestors; that they can convey this experience to other molecules, and so from generation to generation of the molecular series; that the impulses will assert themselves at the right time and place in the developing organism.

"There is only one conclusion of evident value, at least at the present time, which we can gain from the facts above noted, and this is in effect that matter, even in its simpler states of organisation in the atom or molecule, may contain a practically infinite body of latent powers. So far, of course, we have seen this soul-bearing capacity of matter, in its simpler states, only in the organic realm; but he would be a rash man who should affirm that this was the only place in nature where the material or chemical substances were enabled to become the keepers of intellectual seed. From an *a priori* point of view,

and without reference to the facts which we have gained concerning the sequences of organic life, it appears to me less difficult to suppose the capacities of an individual mind to be perpetuated after death, and this in a natural manner, than to explain the phenomena of inheritance which are clearly indicated in the organic series. To account for these evident truths demands the supposition of such colossal potentialities in the psychic capacities of matter that we can hardly see a limit to the field of its possible action." [1]

That causative action should ever arise from nothing, that chaos should ever beget a cosmos, that the motion-of-objects should ever transform itself into the sense-of-motion and this into the consciousness-of-motion, — are propositions that set at naught every canon of scientific thinking. The doctrine of evolution, which has been applied so successfully to the morphology and descent of organisms, seems to apply equally to the morphology and descent of mind; for organic and psychic changes run *pari passu* wherever we can trace them. The philosophy based upon merely mechanical conceptions regarded the cause of the world as a *Deus ex machina*, standing outside the finite order of events and acting in some inconceivable way upon a primeval chaos;

[1] N. S. Shaler, *The Interpretation of Nature*, pp. 291, 296.

which, by external touches, has been transformed into a cosmos. The philosophy based upon biological conceptions derives all life from pre-existent life, all thought from pre-existent thought, and finds no chaos because it reaches no limit to the sweep and operation of law. The former represented the Creative Power as outside of the world, wholly sundered from it, and transcendent only. The latter represents the Creative Power as in the world, immanent in man as well as transcendent over him.

IV.

THE GENESIS OF FEELING.

Pleasure and pain seem to be, respectively, the psychic concomitants of organic processes of development and deterioration, of victory achieved and defeat endured. Pleasure is the usual accompaniment of advance, pain of retreat, in the adaptations of life. They are the psychic aspects of enriched and expanded existence on the one hand, and of impoverished and contracted being on the other. Eating, drinking, and healthful exercise are pleasurable. Mutilation, disintegration, and compression are painful. But, while all this is true in a general sense, these propositions do not express the precise discrimination between pleasure and pain. Elaborating an idea advanced by Kant, Professor Bain says, that "states of pleasure are connected with an increase, states of pain, with an abatement, of some or of all the vital functions." [1]

[1] Alexander Bain, *The Senses and the Intellect*, p. 283; also, *Mind and Body*, p. 59.

Dr. Paul Carus[1] has clearly pointed out the inexactness of this view; for, as he shows, growth is sometimes accompanied with pain, and decay is sometimes painless. Pleasure is rather the psychic aspect of a special organic adjustment and pain the psychic aspect of an organic disturbance. As we shall presently see, the normal condition of this adjustment is an organic rhythm, while that disturbance which is the condition of pain is an interference with this rhythm. Growth may produce pain, as Dr. Carus says, by disturbing this rhythm in the process of readjusting it. Decay may affect it so slightly at any given moment as to be perfectly painless.

The Subconscious Elements of Feeling.

The sensibility of a single living cell, shown objectively only by its response in movement, regarded subjectively must be exceedingly small. When it becomes part of a consciousness, — that is, part of the subjective aspect of a considerable aggregate of sensitive cells, — it may, however, be relatively great. But the psychic aspect of action in a single cell, being by the conditions of the case limited and incapable of self-expansion when such a cell is isolated, may have little resemblance to a human con-

[1] Paul Carus, *The Soul of Man*, p. 340.

sciousness. It is an element only, and, as such, is but the mere fragment of a sensation.

Weber's law requires that, in order that a sensation should be increased in arithmetical proportion, the stimulus should be increased in geometrical ratio. Although this law may not hold true universally, it shows that, within the limits where it applies, sensations move in waves, in the hollows of which, so to speak, the elements of feeling do not rise to consciousness, but on the crests of which consciousness floats. But it would be illogical to maintain that below the so-called "threshold" of consciousness there is nothing at all, and that at this threshold something is suddenly produced from nothing. Nor can it be held that at this point, for the first, physical energy is transformed into consciousness, — a hypothesis not only utterly inconceivable but attended with most serious difficulties. We know as clearly as need be, that, at lower levels than the lowest in any human consciousness, — or in any canine or feline consciousness for that matter, — sensibility exists, as shown by the lowest organisms. It is reasonable to believe, and in the light of all the facts almost inevitable, that at the threshold of consciousness the previously subconscious elements unite, and in their union produce consciousness.

The General Theory of Pleasure and Pain.

Now, if this be true, there are in every living organism capable of consciousness these subconscious elements which, when brought to the threshold, — that is to say, when they are so unified as to enter into the state called consciousness, — may appear either as pleasure or as pain, according to the conditions under which they are united. Our experience is that, whatever stimulus excites the organism in such a manner that the excitation is diffused over the organs equably and normally, — that is, in harmony with their various capacities of action, — pleasure results. But when a stimulus excites the organism in such a manner that it is not thus diffused, but is concentrated intensely upon a single organ or group of organs, so that it overtaxes and tends to disintegrate the organ, then the result is pain.

We see, then, that every organ, and hence the entire organism, has its own fundamental rhythm, or succession of alternate periods of action and repose, acquired through habit. All continued action becomes painful, and pleasure is conditioned upon change. But it is change of a specific kind, namely, that rhythmic excitation which involves the alternation of action and repose at periods determined by the equilibrium of each set of organs, and, therefore,

by the balance of energy in the organism as a whole. If this theory is correct, it should not only account for the lower forms of pleasure and pain as illustrated by the periodicity of the appetites and the desire for sleep, — which it very readily explains, — but also the higher range of æsthetic enjoyment as related to the pleasure afforded by nature and the various arts. This is the most crucial test to which the theory can be subjected, and, accordingly, we proceed to inquire whether or not it is sustained in this superior realm of sensibility.

The Pleasure of Muscular Movement.

A certain pleasure accompanies free muscular movement, as in walking and running. This passes into pain, however, if the exercise be taken under constrained conditions, or continued to a point where weariness ensues. The explanation is, that external constraint and over-exertion disturb that fundamental rhythm with which free motion, within proper limits of time, is in harmony. But such free muscular motion is accompanied with augmented pleasure when it becomes rhythmical; that is, when its variety is restrained by a pervading order which gives it unity, as in the dance. And yet it is not every rhythmic movement which is attended with pleasure,

but only such as may be integrated into the fundamental rhythm of the nervous system. This is illustrated by the pleasure afforded by rapid movements at one time and by slow movements at another, according to the prevailing nervous rhythm; or, to translate the conditions into psychic states, according to the mood of mind. What is at one time pleasurable, at another may be painful. But the pleasure attending motion becomes more intense when it assumes the phase of expansion and the fundamental rhythm is quickened so as to harmonise the greater variety by the increased acceleration of this rhythm itself. And yet this soon reaches its limit, for the organism suffers exhaustion under this augmented stimulation, and the period of activity must be followed by a period of repose. How real the sentiment of expansion accompanying this quickening of rhythm is, may be shown by the ecstasy, the sense of inspiration, and of divine possession, which are generated in certain religious dances, as in the ecstatic worship of Bacchus and Cybele and the spinning dances of oriental Dervishes.

The Pleasure of Musical Sound.

The transition from the dance to music is an easy one. The origin of music is, perhaps, found in the appeal to the ear to excite and sustain the

rhythmic motion of the muscles. Rhythm is thus carried up into the sphere of an exceedingly delicate and sensitive organ. From the beating feet of the dancer, which are themselves audible, it is but a little interval to the intensified beat of other feet, as when the Andamans use a hollow dancing-board, on which a man is set apart to stamp, thus creating a standard of time for the other dancers. The Kamchadales accompany the dance with a periodic hiccough. The Tasmanians beat rhythmically on a rolled up kangaroo-skin, a rudimentary drum. This is a primitive musical instrument, indeed, but music is plainly in course of evolution. The New Caledonians whistle and strike upon the hip. Instruments of percussion, like drums, are quickly followed by wind-instruments. The bow-string may easily have been the first monochord, from which by easy stages the tetrachord of the Greeks would follow. The lyre easily becomes the harp; the harp closely compacted upon a sounding-board becomes the violin; and, laid upon its side in a case and beaten with levers it becomes the harpsichord and the piano-forte. But the human voice is a ready-made instrument whose resources would be very early discovered, and thereafter song would mingle with the movements of the dance as its accompaniment and superior analogue.

It is far from the purpose of this sketch to enter into the intricacies of music. It is sufficient for our purpose to show how its regulated succession of sounds and harmony of tones produce pleasure under our general principles.

The air is a vibrating medium whose periodic pulses beating upon the auditory apparatus, under certain conditions, are accompanied by sensations, to which we give the name music. The most important of these conditions are as follows: —

(1) Musical sounds are marked by *regularity* of repetition in the movement of a vibrating medium, while irregularity in the movement of sounding bodies characterises unmusical noises.

(2) The *pitch* of a note depends on the duration of time in which the vibrations take place. Notes of varying frequency of vibration produce variety of pitch. When one note is produced by a motion twice as rapid as another, the two sounds blend together, and they are said to be an octave apart.

(3) The *loudness*, or intensity, of the note depends on the magnitude of the vibratory motion and on the pitch. When the pitch is high, the loudness produced by a given magnitude of motion is greater than when the pitch is low.

(4) The *quality* of a note depends upon the form or shape of the vibration. The harmony of accordant

notes is based upon equivalence of form in the vibrations, as may be mathematically proved.

All this would lead us to expect that there is in the auditory organ a receptive mechanism by which harmony may be produced within the organism. This anatomy shows to be true. The delicate organs of the ear are capable of sympathetic vibrations. Each of these fine organs, corresponding to a definite mode of vibration, is seldom called into exercise by its appropriate stimulus, and yet has its own inherent capacity. Being comparatively little used, these organs are in a high state of nutrition, and, therefore, when excited, are capable of lively action. When called into play, they afford a copious enrichment of sensation, provided this can be integrated with the pre-existent nervous rhythm, and they also furnish a large expansion of psychic life, if the pre-existent nervous rhythm can harmonise the auditory sensations evoked by their action. We have an example of this enrichment when we listen passively to music, and of this expansion when we actively join in its production, either outwardly or inwardly, by adjusting our psychic movement to the movement of the music. We perceive also that, if the sounds that impress the ear are either discordant with one another, or discordant with our prevailing mood in such a degree that they cannot be brought into accord, it is not music to us

but mere noise. This explains the disagreeable effect of gay music upon a mourning soul, and of funereal music upon a lively company.

The Pleasure of Poetical Form.

The passage from music to poetry is but a step. The rhythmic basis of poetic form is already present in musical movement. Words, chiefly expressive of emotion, or standing as signs of vivid images suggested by emotion or creative of it, are readily added, and the chant becomes a song. The song is the germ of all literature, the rudimentary art-product of the literary artist, long antedating the art of writing. The earliest poems of every race are lyrics, orally preserved, the connecting links between spontaneous and rational expression. The imagination finds in the voice a new organ of expression. The mimetic dance is no longer dumb, but the unfolding intelligence strives to *tell* the story, which in its earliest stages it can only *act*. But the old is not wholly rejected in the interest of the new. As in all ascending life the lower is carried up into the higher until the higher is so perfected as to set itself free as an independent entity, so early men continued to dance to the new music and to sing the new epic.

All the earliest poetry is without terminal rhyme,

which is the latest of poetical adjuncts, and without even alliteration and metre, both of which are accessories imposed by the reason as the faculty of order and of law. All public utterance at the primitive festival is poetical. Even oratory in its primary persuasive stage, so far as its early vestiges remain to indicate its nature, was originally poetical in the highest degree, and became differentiated from poetry only by the gradual intervention of reasoning, — the substitution of conviction by proof for persuasion through feeling and exhortation. Even in modern times it has not wholly lost its primary poetic alliance, and every rhetorician distinguishes between the style that is fitting for the oration and that which may be allowed in the essay.

The essence, or ideal element, of poetry is conformable to rhythm as its vehicle. There is a feeling of incongruity in the attempt to express the involved and demonstrative processes of thought in the form which has been so long associated with emotion and with which it alone seems to be allied. Hence, the nobler modern epics, filled with reflections, and regarded as the media of some vast "argument," naturally assume the freedom of blank verse, and its line is instinctively lengthened to the compass of its complicated contents. Poetry, however, must be, as Milton said, "simple, sensuous, and passionate." It

may fall below argument, even below the form of the proposition, to the level of successive images, and still be poetry. Such, in its beginnings, it surely was. It was a succession of hints to the imagination of the hearer, not too definite, but boldly suggestive, and the stimulated fancy filled in its missing terms. Its theme was an exploit or an event well known to all who listened to the recital, and the poet's skill consisted in making vivid to the mind what the mind already contained. Hence, it has become a tradition of poetry to exclude the didactic.

We readily apprehend the cause of the æsthetic sentiment which poetry awakens. As the product and expression of feeling in semi-musical forms, it appeals to feeling directly by offering itself as a superior embodiment of what is already felt. The great service of the poet to mankind has always been in voicing man's profoundest sentiments. He is, as the word "poet" signifies, the "*maker*" who gives form, and through form more reality, to what is most universally felt, but which few can embody in fitting words. Our enjoyment of poetry consists, on the receptive side, in that enrichment of life which results from the union of these vague and unuttered feelings with the intelligible forms of the understanding; and, on the active side, in that expansion of mind that accompanies the effort to em-

body the poetic ideals in the unity of our individual life.

The Pleasure of Light and Colour.

We pass on to examine the sources of æsthetic pleasure afforded by the arts of form. All of these arts produce their effects through the same elements of expression, which may be reduced to two: (1) *light*, and (2) *line*. By "light" we understand all those effects of vision which are produced by the variation of ethereal vibrations, whether it be in the composition and contrast of variegated tints, or in the varied intensity of reflected white light as exhibited in masses of relative brightness and shadow.

Whatever constitutes a visual image, apart from the effect introduced into it by the muscular motion of the body, and especially of the eye in the processes of determining and analysing the image, we ascribe to light. All that is added to the effects of light by the processes of adjustment and analysis is included under the designation "line." It is obvious that, if it can be shown that all visual effects are embraced under these two terms, we have what is common to architecture, sculpture, and painting, as arts of form. Their differences consist merely in the diverse uses made of visual images in the development of these arts.

The modern theory of light brings all its elements

within the scope of our conception of pleasure as a concomitant of rhythmic motion. Light is a mode of ethereal vibration capable of arousing in the mind a certain class of sensations when it excites the optic organs in certain specific ways. Darkness is altogether negative, the absence of light. Moving in right lines, light is capable of being reflected by most objects, and images are produced by the reflection of it. Light is found on analysis to consist not of one but of several modes of vibration which are capable of being combined so as to produce a sensation of whiteness. These modes of vibration may be separated by passing a ray of white light through a prism in such a manner as to give us the seven prismatic colours, — red, orange, yellow, green, blue, indigo, and violet. Each of these prismatic colours has its own special wave-length, ranging from thirty-seven thousand waves to the inch in red rays, to sixty-five thousand waves to the inch in violet rays. As one inch is contained sixty-three thousand, three hundred and sixty times in one mile, each wave of violet light bears about the same proportion to an inch that an inch does to a mile. As some surfaces reflect pure white light, while others absorb it, so others reflect certain prismatic colours which still others absorb. A surface reflecting the red rays in white light and absorbing all rays not red, appears

to be red; a surface reflecting violet rays and absorbing all rays not violet, appears to be violet. The variegated appearance of things is, therefore, due to the constituent properties which adapt them to reflect certain rays and to absorb others.

But this is not the whole account of the matter. The eye imposes certain conditions upon vision arising from its peculiar structure. There are two essential parts of the eye: (1) an outer or conducting part, by which the waves of light are received and converged upon the sensitive part; and (2) a delicate nervous structure, or inner portion, fitted up with fine rods and cones, which modify the impressions received and transmit these modified impressions to the brain, where they become a visual image. The outer part is the crystalline lens, similar in function to the lenses used by opticians. The inner part is the retina and its prolongation the optic nerve. Each point of the retina receives a ray reflected from some point in the visual field. The image produced here is not what is seen, but it produces effects in the brain where vision takes place, and what is seen corresponds with the image on the retina rather than with the external object. This is illustrated by colour-blindness, a phenomenon which proves that the retina modifies the image. To some persons all red objects — or those which appear so to the majority —

seem green. This must be owing to some modification of the image in the retina. It is probable that the rods and cones in this organ are specialised for different colours, and when there are none of these corresponding to red, red colour is not discriminated.

But we cannot enter into the details of the physiology of vision. It is sufficient for our purpose to show the connection of visual perception with our general principle of pleasure. Is there, as in the case of hearing, provision for rhythmic correspondence? Unquestionably there is. As in the case of hearing the organs of Corti furnish an internal instrument for the reception of external rhythmic motion, so also the retina supplies such a medium for the rhythms of light. But it may be less obvious at first that there is anything in objective colour corresponding to the rhythm and harmony of objective sound. Most musical sounds are made by man himself, and, excepting the songs of some birds, and possibly a very few natural notes, music is a human production. Not so with the effects of light. The eye is much more delighted with natural colour than the ear is with natural sound. Every one will admit that, in any given day, apart from human speech and music, he *sees* more than he *hears* that gives him pleasure. Sound seems rather the accident than the intention of nature, as compared with colour. Silence,

not sound, pervades the celestial spaces, while light travels everywhere in space. But our theory of pleasure finds a strong confirmation in the fact that not light as such, but such effects of colour as can be integrated with the fundamental nervous rhythm, or can stimulate this rhythm to harmonise its added variety, — afford an increment of pleasure. The dazzling sun, the reflecting sand of the desert, the glare of white surfaces, the strong impressions of unmixed colour — do not produce pleasure. It is tempered light, delicately contrasted tints, the subtle effects of chiaroscuro — that afford us delight.

The explanation of all these facts is apparently found in this: the organ of vision has been developed by the impact of light and adapted to those colours which abound in the environment of man's daily life and in the degree in which they are present. Every landscape, therefore, affords for the race that inhabits it, that common feeling, connected with the exercise of the colour-sense, which is neither pain nor pleasure, but a prevailing satisfaction. The *occasional* colours, like the occasional sounds out of which music is created, have given man an increased pleasure, first, by their isolated effects and later by their more refined combinations. But when these rarer colours are made too common, we soon weary of them, and they become positively painful. If the

landscape were coloured permanently and uniformly red, without a radical change in our organ of vision, it would affect us as disagreeably as the monotonous beating of a drum or the tooting of a horn with a single note. Grant Allen has well said: "In external nature, untouched by the hand of man, the violet end of the spectrum is much commoner than the red. On the hills and valleys around we see masses of green; in the clear sky above an unbroken azure. But only an occasional flower, a stray butterfly, or a solitary bird yields us crimson, purple, or orange. From this arise several noticeable æsthetic results. In the first place, our eyes, having naturally adapted themselves to their circumstances, are capable of enduring much greater and more prolonged stimulation from green and blue surfaces than from red and yellow. Hence, we prefer a preponderance of these hues in the visual field; we demand that a landscape should chiefly consist of sky and foliage; and we require abundant green as the background to a bouquet, which seems otherwise too staring. But, on the other hand, the rarer stimulants of reds and yellows are more distinctly pleasurable in themselves as arousing function in seldom-excited nerves; while the greens, blues, and greys are rather sought after as reliefs from excessive action. Furthermore, the colours of the red end of the spectrum would seem

to have assigned to them weaker or less numerous fibres than those of the violet; which is only what we should expect from their lesser frequency. Accordingly they more rapidly fatigue the organs; and though admired in masses by coarse natures, children, and savages, they are only endured by the refined in small amounts, properly relieved by other tints."[1] And so, it seems, the common hues of nature come to be felt by us as intervals of silence between the impulses imparted by more rare and stimulating colours. It is in this chromatic rhythm, this alternation between the relatively neutral and the relatively positive colour-effects that pleasure is experienced.

This may be further shown by reference to the phenomena of "complementary colours." This is the name given to colours which in conjunction make white light. Thus, red is the complementary colour of green, and *vice versa*. If we look steadfastly for some time at an object of either of such a pair of colours, and then suddenly look at a white wall, we see its complementary colour projected on the wall, having the form of the object first observed. Thus the eye, without external stimulus, but aided only by its own rhythmic tendency, extracts from white light the complement to a colour

[1] Grant Allen, *Physiological Æsthetics*, pp. 154, 155.

which has wearied it. This shows us also why certain colours "harmonise," and others do not; the inharmonious colours actually fatiguing the eye, the harmonious colours literally resting it by permitting the variety of hues to be integrated in the fundamental nervous rhythm. Violent contrasts of colour which cannot be thus unified, so often seen in dress and decoration, are positively painful to a refined observer. We see also that a single bright colour pleases, because it both stimulates and permits of rest. But a contrast of colours pleases more, provided it be a contrast of harmonious colours, because it affords a relatively greater variety and still admits of integration. But violent contrasts are almost never pleasing, because the rhythm of the retinal fibres induced by light-waves of a given length cannot easily adjust itself to wave-lengths of a widely different order. Hence, to produce a pleasing effect, there should be a gradual continuity of transition. This is more easily accomplished with delicate tints than with "loud" colours. The inimitable colour-effects of sunset are largely due to this principle of modulated transition; for, although the brightest hues are often mingled, the fleecy substance of cloud admits of a marvellous delicacy of gradation.

The Pleasure of Form and Proportion.

We pass now to consider line, the second element of form. Objects are bounded by limiting surfaces and have definite contours, so that every visual image contains lines which are significant in the interpretation of that image. As Guido Hauck says: "In the process of seeing, the eye in continual movement passes over the whole object, fixing it at every point, either following its contours or attracted by the varying impressions of light, which, vaguely apparent in different parts, are sufficient to attract the attention to themselves. At no point does the glance dwell, but it returns rapidly to every point passed, so that gradually there are formed more or less lively reminiscences of each part, out of which the resulting complete possession is put together. The facility of the eye in accomplishing these journeys is so great that the details of the process quite escape our consciousness." [1] It is thus apparent that, simple and immediate as our perceptions of form seem to be, they are in reality composite and mediate. The constant movement of the eye in perception gives rise to certain muscular sensations. It is through these that we judge of distance when size is known, and of size when dis-

[1] Guido Hauck, *Die Subjective Perspective*, p. 7.

tance is known. They constitute what Lotze calls "local signs," which serve as data for discrimination of space-relations. Regarded as subtle forms of feeling, they enter as elements into the æsthetic enjoyment of form. When they correspond with the fundamental rhythm of the nervous system, that is, when they afford variety in unity without weariness to the organism, they produce pleasure. There is a delight in following the graceful curves of an antique Greek vase akin to the pleasure derived from music.

We may illustrate the truth of this proposition by two facts of observation. The muscles of the eyeball act more easily along horizontal than along vertical lines. We may prove this by the difficulty we have in judging of vertical distances as compared with horizontal distances, especially when estimated laterally. The cause of this experience is our greater habitual use of the eyes in lateral directions. The result of it is, that a building as high as it is wide seems wholly out of proportion. In truth, what we call "proportion" is really the pleasurable rhythm of these muscular movements connected with vision. It is also well known that a curve, if constant, is æsthetically more pleasing than a straight line or a sharp angle. Hogarth apprehended this fact, and gave the name "the line of beauty" to an S-shaped figure

which he used as a symbol of the beautiful. All who have seen the spirals and swirls which Elihu Vedder is so fond of introducing into his drawings, must have felt them to be of powerful effect. The secret of this doubtless is found in the principle enunciated by Wundt, that "a line of gentle curvature is the line of movement most easy for the eye to traverse."[1] Now it is worthy of notice that curved lines have the most effect when vertical; and that we do not demand that horizontal lines be curved, unless they are very long. All this shows that since curvature diminishes the effort of following vertical lines, objects may be tall provided their sides are curved.

The pleasing effect of line, then, is to be referred to that constant integration of variety with unity which is also the source of pleasure in dancing, music, and poetry, and in the harmony of colours.

The Specific Qualities of Æsthetic Pleasure.

So far we have dealt almost exclusively with the merely sensuous elements of æsthetic pleasure, reducing them all to the integration and harmonisation of variety with the fundamental unity of nervous rhythm. If we were to pause here and lay claim to

[1] Wilhelm Wundt, *Grundzüge der Physiologische Psychologie*, vol. ii, p. 215.

having supplied a complete *rationale* of æsthetic pleasure in its widest and highest sense, we should certainly expect our theory to be rejected for two serious reasons: (1) what has been said in explanation of æsthetic enjoyment appears to be equally applicable to the experiences of the lower animals, on whose level we cannot place ourselves, and which we cannot, on the other hand, elevate to our own altitude of æsthetic appreciation; and (2) the distinction between æsthetic pleasure and pleasure of every other kind is nowhere clearly indicated, and if this discrimination be not made, we seem to maintain that there is no essential difference between our enjoyment of our breakfast and our delight in a symphony. We must now show that our theory is not open to these objections.

That there are individual men, and perhaps whole tribes of men, who do not rise much, if any, above the grade of the most sagacious animals in the appreciation of the beautiful, it would not be difficult to prove. But it is not so important to adduce evidence of this as it is to show why the immense disparity in æsthetic appreciation exists among men. This difference will be found to rest upon two considerations: (1) æsthetic pleasure exists passively only where there is distinct apprehension of variety in unity in the presentations of sense; and (2) it

exists actively only where this variety in unity is carried into the realm of ideas by the operation of imagination. We have no evidence that the lower animals, which perceive with such remarkable keenness, select and combine their percepts so as to isolate them from the tissue of perception. This, however, seems to be universally characteristic of man, but in varying degrees. Let us try to make the point still clearer. All the animals lower than man capable of perception seem to preserve mere transcripts of what they perceive, so that their experience is a continuous panorama of perceptions and memories *as perceived*. Man, on the other hand, perceives *selectively*, detaching certain elements from the web of sense-presentations, and preserves these detached percepts in a state fit for original recombination. The imagination, or combining faculty, in man then acts upon these detached percepts or ideas, and produces results wholly unlike the original order of perception. This distinction is, of course, incapable of rigid demonstration, for we cannot be certain that animals lower than man *never* perform this work of detachment and recombination. But that is unnecessary to our thesis. We know that man does this, and that, as a consequence of it, he becomes an artist in a sense in which no lower animal is.

Now, it is evident that pleasure connected with the

lower organic functions of the body, and pleasure connected with the operations of imagination, are two different orders of experience. The second of these we regard as the sphere of æsthetic pleasure. But we can in no legitimate manner sunder æsthetic enjoyment from sensuous pleasure. It is simply sensuous pleasure carried up to a higher power through the operation of superior psychic activities. If the dog does not appreciate a painting, it is not because he cannot be affected by light and lines, but it is because he cannot perform the work of imagination by which the picture is created and interpreted. He cannot even *see* the picture as we see it; because he cannot mentally detach the properties of the painting from its flat surface, grasp its perspective, and project its lines in space. For the same reason he cannot enjoy a symphony, or the beauty of a mountain-side rich with the glory of autumn leaves. But many men and all young children are equally impotent. It is because they lack imaginative power.

It will naturally be asked, What is the use of an organic explanation of the pleasure which we derive from sounds and sights, if, after all, this explanation does not suffice, and another must finally be sought in some higher activity? The obvious reply to this is, that in so far as æsthetic pleasure is of a sensuous nature, it must have a sensuous explanation. It is

equally obvious that, in so far as it is not of a sensuous nature, we must seek an explanation of it beyond the realm of sense. For this intellectual element which constitutes the distinctively *æsthetic* phase in our appreciation of nature and art, we must seek an explanation in intellectual activity. We find it in the reduction of the variety of sense experience to the unity of the intellectual life. This unity is that of the fundamental nervous rhythm carried up into the sphere of intellection. This is *reason*, which is not only the intellectual unity of the individual mind, but of all nature also and of all nature's products. It is through it that universal truth is possible. Imagination detaches from sense-presentations those elements which are capable of forming a higher union, and, employing these elements as its materials, combines them into higher harmonies. Thus man continues the process that nature has employed in evolving higher from lower organisms. His highest appreciation of natural beauty is based upon the discernment of an ideating process in nature similar to his own. Below this there may be a feeling of sensuous beauty, and this must be shared by the whole sentient creation, for the very nature of ascending life is that of enriched and expanded sentience; but æsthetic pleasure in man, although its roots run as deep as his physical being, rises also

to the heights of his reason, and towers above the possibilities of the animal in the apprehension of the *ideal.* And this must not be taken in the Platonic sense of an archætype from which every reality is a degenerate offspring. It is rather that unrealised possibility, that final perfection of each type, that surcharging of material form with spiritual significance, toward which nature has moved in her unfolding, and man in his advancing interpretation of nature. It will be found that the fundamental rhythm of the simplest organism is but the soft pulsing of unfolding reason:—*feeling* in the *animal*, and *thought* in *man.*

The Basis of the Fine Arts.

What has been said will enable us to understand why the fine arts recognised by æsthetic science are founded upon the presentations of sight and hearing only; while the lower senses, touch, taste, and smell, have not served as spheres of art-creation and have not been regarded as belonging to the province of the beautiful. Cookery has, indeed, sometimes been described, in a complimentary manner, as one of the "fine arts," but it has never seriously taken its place in this category. We hear also of "symphonies of odours," but the expression is figurative. And yet, from a sensuous point of view, the delights of the

table and of exquisite perfumes are not less intense than those of the eye and the ear. But these pleasures, although doubtless depending upon the same law of rhythm that prevails throughout the whole range of our sensibilities, are incapable of distinct *ideation* and have only a small representative value. We find that every language is poor in words discriminating these lower sensations, even though rich in terms pertaining to the higher senses. These inferior sensations are almost wholly subjective, and therefore, personal. They furnish no symbols for objective art, except in poetry. For all these reasons, they present but feeble attractions or possibilities to the imaginative activity. Hence, they have remained upon the plane of the animal pleasures which they, perhaps, best illustrate ; for it is highly probable that in creatures lower than man, sights and sounds also partake of this subjective quality in a larger degree than in human experience. The animal is more identified with his own feelings and less able than man to abstract images from the sensational matrix in which they are embedded. The animal is but half disengaged from the physical process out of which life emerges, while man possesses a sense of independent being and creative faculty. Sights and sounds are more readily floated off from their material connections than the lower sensations are; and man, en-

dowed with intelligence, purpose, and freedom, is able to live in an ideal realm.

The Nature of Beauty.

If, now, we try to answer the question which the theory of æsthetics has ever regarded as most essential, What is the nature of beauty? we must, in accordance with what precedes, make this reply: Beauty is not a fixed objective entity, nor is it purely subjective. It is a psycho-physical phenomenon having its causes both in the physical world and in the psychic sphere. It is produced by the co-operation of internal and external factors, and in this sense is relative. A sight-seer, wearied with gazing at masterpieces of art, finds himself presently incapable of discerning beauty in the most famous pictures. Coming to them fresh and surcharged with energy, he is entranced by their beauty, and his sight of them is an event in his life. It is so with every experience in the realm of æsthetic enjoyment. There is no beauty in the world, unless we contribute one of its factors. If we bring this to the scene, we find beauty everywhere, but only in the measure of our own receptive capacity or creative faculty.

Regarded subjectively, beauty is the sentiment of enriched and expanded psychic life that accompa-

nies imaginative activity; regarded objectively, it is the combination of qualities that gives rise to this sentiment.

This definition of the nature of beauty may be sustained by a great number of considerations, but the following may serve to show sufficiently that it is in harmony with the whole range of fact and experience.

(1) As we shall see, art originates in the free activity of imagination as a creative faculty. This exercise of freedom in creation is an emancipation from the strictly mechanical order that rules in the domain of necessity. Hence arises in consciousness a sense of enriched and expanded life, — an emotion of the beautiful. It is generated in all play, so long as this retains its originally free and spontaneous character. It is awakened by the dance, which brings into activity a larger number of members than work, — the latter being a definite and constrained activity. Music awakens it, stimulating a larger area of auditory sensibility than ordinary sounds excite. Poetry evokes it, marshalling before the mind a host of novel and stimulating ideas. The arts of form produce it also by opening new possibilities of shape and colouration, thus at the same time enriching the contents of the mind and expanding its powers of apprehension.

(2) The development of art as a social product also confirms this conception of beauty. Art never thrives in isolation. It blossoms and bears fruit in society. All its earliest forms were social, efforts to please or to attract others, or else the common expression of community-life in the festival. The endeavour to express a new feeling or a new idea, or to give extension to an old one, has everywhere characterised the progress of art. It has always expanded the individual's sense of his relationship with his species. Thus we see that its function is one of mental enrichment and expansion, and its characteristic effect is a corresponding sentiment.

(3) We have already shown that æsthetic pleasure is derived from those forms and movements which stimulate without exhausting the sensibility. It is, therefore, the concomitant of the excitation of nervous centres which bring into the field of consciousness a richer and fuller content. It is noticeable that, as soon as these centres are wearied or exhausted, pleasure passes into pain. It is only the ascending wave of feeling, therefore, that possesses the quality of pleasure, or can awaken the sentiment of beauty in so far as this is sensuous. It must be noted, too, that the feeling of expansion is greatest when the largest number of excited centres is active without exhaustion. The instant

this activity is depressed, the sentiment of beauty vanishes, and it can be sustained only by a change which reinforces the tide of feeling by the emergence of new activities.

(4) The truth of our definition is further corroborated by the intimate association between beauty and health, both in the effect which health has in promoting natural beauty and in the increased aptitude which it imparts for æsthetic appreciation. It is a fact of universal observation that health is an important cause of beauty, both in human and in animal organisms. It is equally certain that disease and decay produce a diminution of beauty; form, colour, texture, every æsthetic quality deteriorating in sickness. So intimately conjoined are the organic processes and the psychic states, that we cannot doubt that their correlation is fundamental. This is shown by the enlarged appreciation of beautiful objects of every kind at the full tide of health and the insensibility to æsthetic impressions superinduced by disease. The explanation of all these phenomena seems to be the correlation between the sentiment of beauty and the enrichment and expansion of life. Perhaps the world never seems so beautiful as when, after a long and wasting illness, sun and air and flowers seem like new objects to the expanding sensibility of a convalescent.

(5) It is a noteworthy fact that the most intense experience of the sentiment of beauty is coincident with those periods of development which mark the emergence of new powers, as the epochs of adolescence and of love-making. These periods are characterised by the unfolding of new capacities, both physiological and moral. They are the times when the whole nature is moved to poetry, the product of a new impulse to imagination. It is then that form and movement have a new significance and create new emotions. Nature, which during other periods passes almost unnoticed by the majority of mankind, at this time excites a new interest and exercises a new charm. The person is more tastefully decorated. The moon discloses a hitherto hidden beauty in the evening landscape, and flowers have an unsuspected fragrance and loveliness. These periods mark the climax of life's enrichment and expansion and also the acme of æsthetic apprehension. Can this be only a coincidence? Let us rather say, that expanding life and the sentiment of the beautiful are only the outer and the inner aspects of the same reality.

(6) The appreciation of the beauty of nature is undoubtedly most intense at the epochs just named; but it may, perhaps, be safely said, that it is never experienced except when men see in natural objects

or phenomena familiar or newly discovered ministrants to the enrichment and enlargement of life. The love of nature is by no means as ancient a human quality as at first thought we might suppose it to be. Man's early contact with nature presented him with obstacles to overcome rather than with beauty to be admired. The most ancient art shows little appreciation of inanimate nature. Indeed, it might be truly said that the æsthetic appreciation of natural scenery is a modern sentiment. But the sun and the moon, the forest and the stream, the fruitful field and the shady retreat, these are beautiful because we feel in their presence that they are factors and elements in the expansion of human life. As scientific interest increases, the objects of nature assume a higher æsthetic value, and to the specialist who finds in it the long-sought demonstration of a far-reaching theory, the humblest natural object may seem an apocalypse of beauty. To others who do not share his enthusiasm, he may seem a fanatic, but to him the entranced rhapsodists of idealism seem to represent a less sane fanaticism.

The Sublime and the Comic.

In conclusion, it may be added in confirmation of the idea of beauty which has been advanced, that it

enables us to co-ordinate with it the related ideas of the sublime and the comic.

The sublime is the sentiment we experience when the expansion of being overwhelms our finite thought and contrasts with our littleness and weakness the immensity and power of the infinite. Vast spatial extent, like that of the ocean, the Alpine Mountains, and the celestial distances contemplated by the astronomer; inconceivable duration, like that of the geological periods and the idea of eternity; irresistible power, like that of the tornado, the avalanche, and the volcano; terrific sounds, like those of the thunder, the tempest, and the earthquake; incalculable rapidity of movement, like that of the engulfing flame of a conflagration, the dash of the sea on the rocks, and the flash of lightning, — all produce the sentiment of the sublime. So also do great daring and fortitude, especially in loyalty to truth or duty, giving rise to the morally sublime; as in the calm death of Socrates, the resolution of the Russians to burn their capital to prevent its capture, and of the Hollanders to flood their country with the sea, rather than surrender to their enemies their homes and liberties.

The comic, on the other hand, is the sentiment awakened by a promised expansion which suddenly collapses without fulfilment, but also without harm.

If harm results, the comic does not exist. To enjoy the comic, there must be a certain redundancy or surplus of energy seeking for discharge. The troubled or overworked man, who has exhausted his energies in serious activity, finds laughter difficult, and there must be something irresistibly comic to excite him to it. But overnourished and underworked boys and girls find something to laugh at in almost every occurrence. Such are the indications that the comic depends upon a certain psychic expansion. The other half of the definition is even more clear. The sentiment of the comic is evoked and sustained by a certain disproportion between means and end, cause and effect, premise and conclusion, beginning and ending. There is also a certain suddenness or surprise in the transition from the promise to the fulfilment. Bain identifies the comic with a "reaction from the serious." Herbert Spencer says that laughter, — the expression of the sentiment of the comic, — "naturally results only when consciousness is unawares transferred from great things to small — only when there is what we call a *descending* incongruity." It is not every incongruity, but the incongruity between expanding power and its harmless collapse that really constitutes the comic.

"We should go to the ornithologist with a new

feeling," says Emerson, "if he could teach us what the social birds say, when they sit in the autumn council, talking together in the trees. The want of sympathy makes his record a dull dictionary. His result is a dead bird. The bird is not in its ounces and inches, but in its relation to nature." And this may be said, in substance, of every attempt to translate the life of feeling into the formulas of science. Beauty must be felt to be understood. No definition of the sublime is like its own majestic uplifting. No commentary on the comic is like that "inextinguishable laughter" ascribed to the gods of Olympus and shared by mortals at the banquet-board. As the bouquet of a rich wine is missed in the chemical formula of its substance, as the secret of life escapes the comparative anatomist, who must be content with the mere description of vital organs, so æsthetic pleasure is not to be sought in a theory of æsthetics, but in that relation to nature that enriches and expands our psychic life by disclosing the face of beauty in every reflection of the outer world.

V.

THE GENESIS OF THOUGHT.

THROUGH the special senses there enter into consciousness seven specific kinds of presentation, which are the elements of all thought about the world of objects. These presentations are themselves objects of an elemental kind, modes of impression upon the senses of sight, hearing, touch, temperature, muscular movement, taste, and smell, — which are at once referred to points of origin in space, and regarded as representing qualities in concrete things. But it is evident that the process of perception is a selective one, by which a separation is made between qualities. Some of the properties of things remain unnoticed, while others are sundered from their concrete relations, and are made the objects of exclusive attention.

Our senses are, in reality, sifting-machines, sorting out of the continuous impact of impressions only those which lie between certain limits of intensity and duration, and even discriminating between these

according as they stand related primarily to the needs and secondarily to the pleasures of our existence. What we perceive is, therefore, determined by a kind of natural selection, involving at the same time, the exclusion of the less useful and the appropriation of the more useful among possible percepts. Every organic being thus receives a limitation and a specialisation through its habitual perceptions; and restriction to these and definite reaction upon them, transmitted and augmented from generation to generation, are doubtless the factors in the formation of instincts.

But, of objects perceived, not all are ideated and incorporated in a memory-synthesis. The selective process is continued, and permanent traces are left in the brain of those impressions only which bear some relation to our interests. Thus experience is ever eliminating the useless and treasuring up the useful, abstracting the significant and ignoring the inconsequential.

If, again, we consider the higher activities of the mind, such as imagination, conception, and reasoning, we find the same selective process ever present. In forming any plan, in devising any tool or machine, in producing any work of art, imagination proceeds selectively and adaptively. In forming concepts, all merely accidental and strictly individ-

ual qualities are neglected, and only the essential and universal are regarded. In the process of reasoning, we proceed only to those conclusions which are related to our immediate purpose. Thus the modes of reality with which we deal tend to become more and more select, more and more representative, more and more schematic.

Two Varieties of Thought.

These materials of reflection may be divided into two broad classes, one original and presentative, the other derivative and symbolic. The first class supplies the materials of perceptual, the second of conceptual thought. Direct presentations, with their unmodified equivalents in the memory-series, are the materials of perceptual thought, and seem to be the common possessions of the human and the animal mind. The "concepts," however, elaborated from these elements of perception and memory, are formations of a higher order, not images, but *sums of relations*, and seem not to be formed in the animal mind. A dog may perceive another dog, remember him by the persistence or revival of the memory-image, and distinguish him as friend or foe according to the retinue of circumstances which the memory-synthesis reinstates. But he probably has

no idea of "dog-in-general," apart from all particular images of dogs previously seen. It may be, and it is probable, that a confused and indeterminate image of a dog sometimes flits through his consciousness, the mere outline of the animal, dim and blurred, like a composite photograph. This is, however, too vague to constitute a large factor in the dog's intellectual life, and it is constantly suppressed and overpowered by the clearer perceptual images which fill and occupy the animal's attention.

Man is not confined to this lower level of mere perceptual images. He possesses the idea of "dog-in-general," a concept, or sum of relations, not applying to any particular dog alone, but to all dogs, and he makes this definite, permanent, and capable of reinstatement by giving it the name "dog." This name, being a sense-sign of a clear and distinct character, becomes a definite element in the memory-synthesis, and whenever it is recalled, it revives the sum of relations associated with it as a common centre. These sense-signs — usually spoken or written words — may then be treated like other images of perception and of memory. They are representatives of the higher order in the terms of the lower order. Without this symbolisation, concepts would prove too attenuated and complicated for preservation and subsequent use. Words serve as the coun-

ters of abstract ideas. Thus language becomes the instrument of conceptual thought. Without this instrument, it would never pass beyond the lowest rudiments.

Perceptual Thought.

Although the word "thought" is technically employed to signify only the formation and comparison of concepts, it is plain that it includes processes of a simpler kind through whose complication it is derived. The lowest forms of thinking are judgments without words, discriminations not stated in propositions, although possibly capable of being thus stated. For example, the infant discovers that "fire burns" long before it knows any word for fire or burning. This rudimentary judgment is a simple discrimination between fire and other objects, and an assimilation of the perception of fire with the sensation of burning. That sugar is sweet, that riding is pleasant, that the dog may bite, — are judgments of the same order. Such discriminations must evidently be made before there is any need of propositions to express them, and they are modes of experience which we must attribute to animals very low in the scale of intelligence.

In such perceptual judgments there is simply the perception of agreement and disagreement. This

relation, when it afterward comes to be expressed, is designated by what logicians call a "copula," the word "is," or its equivalent, and its negative. "Sugar *is* sweet" is a proposition in which two signs, or symbols of perceptual elements, "sugar" and "sweet," are affirmatively related. In like manner, disagreement is expressed by the insertion of the negative, "Sugar *is not* bitter." But these relations of agreement and disagreement may be known without being expressed, or even thought of in words, and the judgment may be clear without the knowledge of any words whatever. All judgments imply (1) analysis, — or the separation of objects and their qualities; (2) synthesis, — or the union of objects and their qualities; and (3) a consciousness of these processes. But perception itself is an instance of such analysis. The senses themselves sort and segregate. Even external motion parts and blends the objects of sense. The central organs, on the other hand, unite and aggregate. They bring together in a synthesis of consciousness what the senses have subjected to analysis.

The several sense-organs select their appropriate stimuli and transmit these to the brain. But these excitations of the brain do not remain separated in their respective centres. Connecting fibres combine them into more complex wholes. To these higher

unities we give the name "ideas." Our idea of a dog, for example, is not merely a visual image, but is composed of this and all the other sense-impressions derived from the animal. These complex wholes unite in the memory-synthesis, and the presentation of any one of these factors may revive the whole idea. Thus, I hear the barking of a dog. This sound reinstates the visual image of the dog. This image revives the recollection that he is my dog, and has been shut out of the house. As the result of the dog's barking, I execute the complicated act of going to the door and letting him in. Every "idea" is a complex net-work of inter-related impressions. Subjectively, the judgment "The dog barks" is the apprehension of these two elements, "dog" and "barking" as related. Objectively, it is the relation itself that is the ground of the judgment. In furnishing the condition for apprehending this relation, the connecting fibres in the brain furnish the condition for judgment.

We see, therefore, that human thinking is originally the projection into an individual consciousness of activities which transcend, but have predetermined, that consciousness. The finer our analysis of the process of thinking, the more we assure ourselves that thought is primarily a refined reflex of the external world. If we had perfect vision of the depths of

objective reality, our own thought would be almost superfluous to us. Our most potent impulse to thinking is the desire to find the means of accomplishing our ends, or to discover the essential unity which inheres in things. But thought begins in the apprehension of objective likeness and difference in the impressions of our earliest experience. In this rudimentary form, it emerges with consciousness itself.

To what a high level such mere perceptual thought may rise is apparent in the mechanical devices and artistic products which are in no way dependent upon language. The artisan and the artist think in percepts, not in words. For this reason they can often give only an inadequate account of their productive processes. It is true that, in this range of activity, means are adapted to ends in a purposive manner, but this implies only the perception of an end and control of means for its realisation. It is amply illustrated in the actions of the lowest animals, where purpose and its accomplishment are clearly evident. The chief differences between the constructive powers of animals and of men are to be found in the relative remoteness of the ends and complication of the means which characterise their activities. It may be true that no creature inferior to man has ever invented a tool or developed an art, but the distinction is one of

degree rather than of kind, for both are capable of purposive action.

The origin of "purpose" in a conscious being is sufficiently obvious. The experiences of pleasure and pain impart to the objects and ideas with which they are associated a special prominence in consciousness. An action which gives pleasure excites all those reflex movements which control and determine pursuit and possession, while an action which gives pain excites those reflexes involved in avoidance and abstention. Analysing our experience, we say that pleasure attracts and pain repels, and this must be universally true. The meaning of this, regarded organically, is, that it is a property of a sensitive organism to preserve its own existence. Whatever tends to promote pleasurable feeling is consciously sought; and this, subjectively regarded, is what we mean by purposive action in the sensuous sphere. Thus, the purpose of an animal in pursuing prey is its capture, which is a means to the ulterior purpose of gratifying appetite. How craftily the animal may fulfil its purpose is seen in the fine diplomacy of the fox. Pursuit itself, without ulterior end, may in time become the only purpose, for the activity involved in it gives pleasure by calling into exercise unused organs surcharged with energy. This is the origin of the play-impulse, the original utilitarian end

having been lost sight of through the pleasure of the activity itself.

It is true that all human purpose cannot be placed upon this low plane of merely sensuous good, for man, by analysis and reflection, usually arrives at ideas of good which transcend the sensuously pleasurable. But reflection itself has its humble origin in merely sensuous purpose. The first purposes of young children, like those of the lower animals, are wholly in the terms of sensuous pleasure. Pleasure, however, tends to assume an increased ideality as new and higher possibilities of experience are unfolded, until the child whose earliest purpose was to obtain sweetmeats for his own gratification has become a philanthropist, willing, and glad, for some far-off good to humanity, to make his life a living sacrifice.

It is purpose, however humble, which lifts thought from the passive repetition of imposed sequences to the penetrating insight and self-determination of reflective activity. The reflective mind is essentially one of strong purpose, aiming at some ideal end, patiently traversing every winding path of possible attainment, until the whole territory to be explored is minutely examined, and the path of advancement is discovered. It implies primarily a capacity for some kind of gratification in excess of what is

afforded by existing conditions, whence proceeds the vigilant, sustained, and insatiate quest which grows at last into a confirmed habit. Tropical climates, with their luxurious food-supply, where food is the only necessity of existence, involving little bodily exertion and filling the senses with perpetual satisfaction, have not been favourable to the development of reflective thought. But the battle with ice and snow, with storm and hunger, have stimulated purpose and awakened reflection, first upon the plane of mere physical comfort, and finally upon the higher level of speculative inquiry and social development. When reflection, inspired by definite and urgent purpose, placed the stone-axe, the spear, and the bow in the hand of man and gave him Promethean fire, he became the master of the animal world, the enthroned lord of creation.

Conceptual Thought.

It is language, however, which constitutes the great barrier between animal and human thought. Judgment and inference, both involuntary and purposive, may be ascribed to animals very low in the scale, for inference is implied in many perceptual judgments. From the footprints of the fox, for example, the dog infers the presence of the animal, and with eager nostril follows the argument to its conclusion. The

same keen perception of sequences may be attributed to every living creature capable of pursuing its prey or escaping from its enemies. All this, it may be said, is easily explicable by the power of association in the memory-synthesis. The sign and the thing-signified are really parts of a single original group of perceptions. They are connected in memory as they are in the original experience. Hence, the appearance of the one involves the reappearance of the other.

Regarded objectively, every revival of an idea implies the partial reinstatement of the physical state which furnished its original substratum. It is a commonplace of modern psychology that, in every act of memory, the centres of the brain affected by the original perception are excited anew in the act of representation. Impressions upon the senses, when sufficiently strong, leave their traces upon the cellular substance of these centres, not as the outlines of a seal upon wax, but as predispositions to reassume the state which perception has produced. Thus, the revival of a spoken word involves the excitation of the auditory centre in a specific manner, not so intense as in the original excitation, but of the same kind. The psychic aspect of this revival is a representation of this word in consciousness. But no word is ever isolated in perceptual experience. It

always occurs as a member of a group of percepts. Upon this association with other percepts depends its "meaning." When reinstated by a new excitation, it brings with it into consciousness its retinue of associated ideas and their concomitant feelings. Conceptual thought, therefore, may be defined as "intracranial speech." The range and character of this retinue of associated ideas and feelings is relatively constant and uniform, but it is subject to some variation. Thus the "meaning" of a word remains nearly the same, and yet it is capable of a certain growth. The associated images, when numerous, tend to destroy or obscure one another. Galton has shown that in children mental imagery is vivid and distinct, and abstract ideas are not easily grasped, while in older and more reflective persons, mental imagery tends to fade out and words suggest mere *sums of relations* rather than clear images. Thus, the word "house" awakens in the mind of a child a specific image of some particular house, while to an adult it usually suggests no definite image whatever, but a generic idea equally applicable to any one of the many objects to which the name may be applied. Here is an evident interference of images, involving a reciprocal abolition of one another, yet the word "house" thereby acquires a richer meaning than before.

In this manner, words come to stand for general

or abstract ideas, the thing-signified being too complex and its examples too contradictory in their qualities to be represented by a distinct image. And yet that which is implied by the word "house" is not a negation but a reality. There flashes into consciousness, when a familiar word is uttered, not a distinct image, but a "sum of relations." This tends, no doubt, to be transformed into a concrete image; that is, the image least suppressed or most facilitated by the connection of ideas in which the word is used. This is not dismissed unless subsequently found incompatible with the conditions of the case.

The bitter historical quarrel between the realists and the nominalists could never have arisen if psychology had been sufficiently advanced to show that, psychologically, sign and thing-signified, a word and its meaning, are only two elements of the same complex reality, — the word being a central sense-sign, its meaning being that sum of relations for which it stands, and which, through association, it is able to recall. But relations cannot exist without things related, and hence concepts have no reality without the percepts which they relate and their objective correlates. Every concept may be considered real if it stands for real relations, but it is purely ideal when the relations are ideal.

Conceptual thought is, as we have seen, a relating activity mediated through language as its instrument. Without it, thought drops to the perceptual level. There may be, however, many kinds of language. We know it mainly as oral and written, but every sense, although with various degrees of excellence, may furnish a system of symbols serving the purpose of conceptual thought. Modern invention has afforded such an instrument to the blind in the sense of touch, and to the dumb in the sphere of manual and labial movements known as "sign-language" and "visible speech."

The objective side of abstract thinking may be studied in the cerebral mechanism of language. This has recently received a remarkable exposition through the comparative study of normal and abnormal cases, and is one of the most brilliant triumphs of physiological psychology.

The Mechanism of Language.

In 1863, Paul Broca, the great French anthropologist, in the course of investigations into the cause of aphasia, discovered the location of the centre of speech, or verbal articulation. He found it in the posterior part of the third frontal convolution of the left hemisphere of the brain. The discovery was received with general scepticism, but is now univer-

sally accepted as perhaps the best attested single fact in cerebral physiology.

Since that time, the centres of hearing and vision, and of the movements involved in writing, have also been definitely located in the brain. We have, therefore, at present quite exact knowledge of the cerebral parts exercised in the acts of hearing a spoken word, of repeating it orally when heard, of seeing it when written, and of reproducing it in writing. These acts together form all the operations of language, except the union of words into judgments, which is provided for in the associative fibres through which these elements are united. In the combination of these elements we have the entire mechanism of conceptual thought, or of thought as conducted and expressed in language.

These elements may be grouped as follows: —

A *word* is composed of
- *a.* an *auditive* image, — the word as *heard*,
- *b.* a *visual* image, — the word as *seen*,
- *c.* an *articulative* image, — the word as *spoken*,
- *d.* a *graphic* image, — the word as *written*.

All conceptual thought consists, on its objective side, of the interplay between these four kinds of images or the sums of relations for which they stand. On the subjective side, it is a consciousness of this interplay, reinforced by definite purpose. Sometimes it is wholly involuntary and aimless, as

in dream and reverie. Sometimes it is intensely voluntary and purposive, as in the effort to solve a problem. It is always, however, dependent upon this mechanism, weariness rendering thought difficult, overstrain making it painful, and disease of the brain rendering it impossible. There is a condition of "verbal deafness," in which words are not understood when spoken, although sounds are perfectly heard. There is also a condition of "verbal blindness," in which written words are not understood, although objects are seen. The loss of the articulative image is called "aphasia," and the loss of the graphic image "agraphia." The phenomenon of "transference" is also to be noted, as when the other hemisphere of the brain takes up the functions of its disabled companion, as the left hand may learn to write when the right hand is disabled. Finally, when all these forms of the verbal image are in default, as in the case of Laura Bridgman and others, the blind and deaf, who cannot acquire either spoken or written language through hearing or sight, may form symbols of ideas which constitute a language in terms of the tactile sense.

The Origin of Language.

Written language, as we know, is a comparatively recent invention, having passed through the succes-

sive stages of pictographic, symbolic, and syllabic representation to its present alphabetic form, the lowest stage not yet having been achieved by certain races who possess a spoken language. Spoken language has long preceded it, but even speech is not the primitive mode of expression. Where words are wanting, gestures still suffice to convey many ideas. Significant gesture is common to all men, who often employ it when spoken words are impossible or not mutually understood. Even more rudimentary than any voluntary signs, however, is that language of involuntary signs belonging to emotional expression, which Darwin has so ingeniously studied and shown to be common to man and the lower animals, — the attitudes, movements, and facial changes which all sentient creatures seem instinctively to understand. Menace, invitation, pleasure, disgust, all show themselves in the muscular positions of eye and mouth and body. The evolution of expression, through the various physical signs which naturally accompany psychic states and constitute their objective aspect, from the significant attitude of a threatening dog to the complex acts of speaking and writing, may be quite clearly traced.

Beginning with natural gesture as the expression of feeling, which is evidently but a higher development of purely instinctive signs, let us attempt to

describe, in rapid outline, the genesis of verbal language. The movements of the arm and hand, previously developed by slow stages through the daily use of these organs for prehension and manipulation, as shown in the higher apes, afford a means of expressing psychic states. Extended with upturned palms, the hand pleads; drawn inward toward the person repeatedly, it beckons and invites; with palm downward and pushed away from the body, it repels. Such signs are universally significant. Used to point out an object and distinguish it from others, the hand becomes indicative and divides between this and that. But we cannot enumerate its manifold capacities as an expressive organ. It becomes the interpreter of things seen and felt. It does this through the union in the brain of sensory centres with motor centres through connecting fibres, until lines of definite reflex action are established. These are the same for all the members of a species. So far there is nothing conventional, nothing but natural impulse.

It is a well-known fact that the majority of persons are right-handed, for what reason we do not precisely know. It may be that some unexplained advantage of the right over the left hand was early acquired, and transmitted and confirmed by heredity. It is also well known that the right side of the body is controlled by the left side of the brain, and *vice*

versa. How shall we explain the connection between prevailing right-handedness and the location of the centre of verbal articulation adjacent to the motor centre of the hand and arm, in the left hemisphere of the brain? Very simply, if we suppose that articulation is merely an extension of manual gesture, and speech only an effort to reinforce gesticulation with the organs of the voice. In left-handed persons, the speech centre should, upon this theory, be located in the *right* hemisphere of the brain, and not in the *left*, as in right-handed persons; and it is a fact that in left-handed persons aphasia occurs not in the left, but in the right hemisphere.

Oral speech, then, must have had its origin in the concomitant action of voice and gesture, a concomitance which is instinctive in every orator. It is also a notable fact that in oratory gesture always precedes oral utterance. As Max Müller has suggested, language probably had its beginning in a *clamor concomitans* emitted while the first men worked and played together, every special attitude and bodily effort tending to specialise the concomitant vocal utterance in a uniform way. Memory and association would connect these specialised sounds with the actions which they accompanied, and thus the sounds would be rendered significant. Thus an organic commerce of excitations was gradu-

ally instituted between actions perceived and sounds uttered, so that each suggested the other. In this way a rudimentary vocabulary would be produced. Intelligence and volition, guided by definite purpose, would easily extend the range of expression. It is a notable fact that language passes through the monosyllabic, agglutinative, and inflectional stages. The Chinese language is a case of arrested development in the first stage. The same word, uttered in different ways, may have different meanings. Even in so highly developed a form of speech as English, the same monosyllable may be a verb, a noun, or an adjective. By the union of such words different shades of meaning are expressed. All children learn language by the method of concomitant clamour. They also illustrate the growth of language by their combination of monosyllables to express complex ideas. Should Dr. Garner be successful in securing in his phonograph an exact record of the chatter of anthropoid apes, as he expects to do, he may show that their *clamor concomitans* is significant, each sound being associated with an idea or feeling. The ancient Greeks could not believe that the barbarians spoke an intelligible language, and regarded their talk as like the chatter of apes. Every one who has listened to the speaking of a tongue widely different from his own has been similarly impressed.

The Nature of Thought.

As in perceptual thinking, — that is, in thinking where images are representative rather than symbolic, — thought involves an objective correlate, so also it does in conceptual thinking. It is the subjective aspect of this most delicate operation of the cerebral organism, its symbolic activity. Analysis and synthesis in consciousness, — or judgment in general, — are connected with real objective changes. When these correspond to the movements of extra-cerebral objects and truly represent them, — they are the "truth." When such changes do not correspond to the movements of extra-cerebral objects, but are only molecular activities in the brain-substance itself, — their subjective correlates are phenomena of "phantasy." These products may be co-ordinated and centred upon some useful or artistic end, giving us the creations of genius; or they may be incoherent and abnormally persistent, giving us insane hallucinations.

Spinoza's maxim, — "*Omnis determinatio negatio est*," — "Every determination is a denial," — must not be taken absolutely. Every determination is not a denial in the sense that the formation of a thought requires the absolute negation of the possible existence of its opposite; but it does require the limita-

tion of the content of the thought to a definite mode of being, and the exclusion of its opposite from this particular thought. It is a recognised primary law of thought that nothing can both be and not be in the same time and place. But change, becoming, transformation, are the very essence of thinking. Every thought is the transient aspect of a process. It is essentially an act of *determination*, the inclusion of certain qualities and the exclusion of others.

The laws of thought are such because they are also the laws of things. Logic is authoritative in the processes of reasoning only because it presents to us the code of laws according to which reality behaves. Were its rules and canons not representative of real relations, they would have no validity for thought. The necessity which belongs to logical reasoning, the premises being true, is derived directly from the necessity of the dynamic relations in the object-world.

Logic being the code of causation, causation itself must be logical. All the categories of the individual consciousness are merely the subjective transcripts of relations in the object-world. Time, space, quantity, quality, and cause, are at once categories of thought and categories of things. The universe is thus permeated by an immanent rationality. This is the essential condition of its being intelligible,

and we find it intelligible. All science rests upon the postulate that the object-world may be known; and if we do not know it exhaustively, it is because our senses and our experience are limited, not because it is "unknowable" in itself. Could we travel everywhere and penetrate through everything, we should doubtless find everything intelligible. We should never reach a point where an effect could happen without a cause, or where a thing could both be and not be at the same time and place. When our journey was completed, we should be compelled to think that, if all these inter-related objects were endowed with subjective aspects related as the objects themselves are, there would result a cosmic consciousness. The rational world would then be a conscious world, a cosmos of thoughts as well as a cosmos of things.

The Relations of the Dynamic and the Logical.

The outer world is known to us as a continuous series of dynamic states and changes. The inner world is a consciousness of such states and changes. The world-process, viewed objectively, is dynamical; viewed subjectively, it is logical. The question now arises, Are these changes in the world-process determinations of force, or determinations of thought?

Regarding the objective series alone, we should conclude that they are determinations of force. Regarding the subjective series alone, we should conclude that they are determinations of thought. But what right have we to abstract either aspect of the world-process, and to give to this abstraction either priority or supremacy?

It is true that we cannot assign to inanimate objects a separate consciousness. We believe that the waves of the sea unconsciously dash upon the rocks, and the rocks are unconsciously worn away by their action. The principle of continuity requires the persistence of the sea and of the rocks, and through this necessity of continued being we know that they exist when we are not present to observe them. This is really our ground of belief in their objective reality. But the same principle applies to the subjective aspect of being, for there is continuity in thought notwithstanding the interruptions of our consciousness. All the phenomena of unconscious cerebration, reinforced by the experiments in hypnotism, confirm us in the conclusion that thinking may proceed and its results be utilised without our consciousness. To this it will be said, that the continuity of the subject is certainly broken by the suspension of consciousness, while the continuity of the object is not interrupted. But this answer displays an imperfect analysis, for

no one can maintain that the sea and the rocks exist *as objects* when not apprehended by a consciousness. The truth is that "subject" and "object" are correlative. We must confess the sea and the rocks to be dynamic modes of being, with a possibility of becoming objects when confronted by a subject, but we cannot affirm them to be "objects" out of this relation. An "object" is a mode of being apprehended by a subject. We must also say of the subconscious elements of thought, that they are logical modes of being, with a possibility of becoming a subject when the conditions exist. A "subject" is a mode of being conscious of an object.

But may we limit the continuity of being, as regards either of its two aspects, by the perimeter of our own individual experience? If we are loyal to the genetic method, must we not extend the parallelism of the dynamic and the logical series indefinitely? So far as logical categories are concerned, it would seem that we must; but so far as consciousness is concerned there is this evident limitation: "consciousness" implies a union of elements which is not afforded by every dynamic condition. There is nothing in the composition of water and of rocks, for example, to lead us to suppose that they are themselves conscious. They are things without conscious subjectivity, and yet they are capable of becoming

objects to a conscious subject when the conditions exist for the unification of the impressions made by them. They are, therefore, not unrelated to thought, and may become objects of thought. They cannot be conceived as non-logical entities. They do not think, but they may be thought about. Hence, they are amenable to the laws and the determinations of thought. As parts of the cosmos, they may be objects of thought to a cosmic consciousness. Considered as intelligible formations, produced by processes of molecular change out of pre-existent constituents, they are also thoughts as well as things, for they have meaning as well as properties. They stand in cosmic relations and play their part in the organisation of the world. They are not separate and independent entities standing outside of the world-process. Dynamically, they are related to all the rest of the universe. Logically, they serve as means to the intelligent comprehension of the world. The sea is the cradle of all terrestrial life. The rock-bound continents are the theatres of its highest development. Thus rock and sea, though insensate, become the logical elements of the world's vast argument, the essential premises of all geological conclusions.

While we cannot ascribe consciousness to the individual objects of perception, we are equally incapable of ascribing consciousness to our own indi-

vidual ideas. Ideas are the unconscious elements, in the human mind, of a thought-process which finds its unity in a conscious subject. In like manner, objects, or things in the external world, may also be elements of a thought-process in a cosmic subject without themselves being conscious. This relation to a universal subject in no way affects their character as objects, in no way destroys their dynamic relations, for this union of subject and object is actual in the human mind. As things are through and through both logical and dynamical, they may be to a cosmic subject all they are to us, without our limitations. And here we must not overlook the fact that the proof of subjectivity must always rest wholly upon analogical evidence, and can never be based upon objective demonstration. We accord to our fellow-beings, — men and animals, — a subjectivity in some degree similar to our own, because they are constituted like ourselves; but there can from the nature of the case be no direct knowledge of it. Finding the object-world also a logical world, seeing that it embodies and expresses thoughts, we may infer that some mode of subjectivity, not wholly dissimilar to our own, may exist within it. The unity of the universe as a dynamic whole, and the universal presence of logical categories, afford the conditions of cosmic thought and, perhaps, of cosmic consciousness. Re-

garding it from the subjective point of view, its changes and progress would appear as determinations of thought expressed in dynamic manifestations. A true analysis and a rational genesis require the equal recognition of both the objective and the subjective elements of experience, without priority in time, separation in space, or disruption of being. So far as our minds can penetrate reality, as disclosed in the activities of thought, we are everywhere confronted with a Dynamic Reason.

VI.

THE GENESIS OF WILL.

THERE is in consciousness that which transcends discursive thought, which is not wholly imprisoned within its forms and relations, which represents, as it were, its raw material, untouched by the mould of dialectic. The mystic seeks to experience it in its purity by arresting his logical processes completely, and believes himself to find it in the ecstasy which seems to lift him above all thought, in the state of contemplation. To him, this is the very essence of reality. And may he not be right? Certainly, in deep introspection, from which all purpose and activity are as much as possible excluded, there is the apprehension of what seems the nearest approach to pure being, a timeless, motionless existence, in which all qualities seem merged in perfect unity and indifference, — a state indescribable, void of distinctions, yet the germ of a universal potency. It is attained in those focal states of attention which precede hypno-

tisation and a certain stage of etherisation, on the one hand, and the gathering of all our energies for a supreme volition, on the other. While in the state of poise and indecision, we call it "feeling," but when it passes into action we call it "will."

The deepest insight into the essential nature of "matter," "force," and "energy" of which we are capable, is obtained in the manifestations of these realities in our own bodies. These manifestations we regulate and control by determinations of what we call "will." If the law of physics, "Action and reaction are equal," is universally valid, this element of our subjective experience which we call "will" and "volition" is closely correlated with the determination of energy in the object-world. If we have here only opposite aspects of the same fact, we have in our voluntary experience what the determinations of energy in the physical order would seem to be, if they were subjectively regarded. To a conscious agent, such determinations of energy would be acts of volition. Suppressing consciousness, the determinations would be acts of what Schopenhauer and von Hartmann call "unconscious will."

The Telic Factor in Volition.

Physical motion, or change in the object-world, considered strictly as objective, reveals no purpose,

no teleology. This is true whether we regard the cosmic manifestations of energy in general, or the movements of a living organism, say a human body, in particular. Viewing them as objective changes only, we cannot pronounce upon the question whether or not they are purposive, for every physical change has its own mechanical antecedents, which are sufficient to account for it without the presence of purpose. It is only when we consider such movements subjectively, that we regard them as having a telic significance and interpret them as intentional. Results may be apprehended objectively, intentions only subjectively. Strictly speaking, we can know only our own intentions. By analogy, however, we infer them in others from the objective evidence of their actions. We do so, not because these actions could not happen without intention, but because the probability is against their happening thus. When regarded from the subjective point of view, all voluntary human action is telic, but we cannot always decide whether or not a given action is voluntary. The subject alone, although even he may be deceived, can be certain of that. But what evidence can we have that any cosmic action is telic?

If in the cosmos purpose is manifest anywhere, we should look for it in those results of evolutionary processes which converge upon intelligible products,

in those complex groups of adaptation which require a cause as strictly as any other phenomenon. What cause, for example, is sufficient to explain the origin of the human brain? We may say that the physical factors which have combined to produce it sufficiently account for it. They are its causes. But it is precisely the combination, the determination, of these efficient factors which needs to be explained. Looking at these factors at various levels of their combination, we may see the result to be already predetermined. But when we descend to their most elemental form, and find them apparently homogeneous, undifferentiated, one in essence, as in the original protoplasm of living beings, or the protyle of the chemical elements, how are we to account for that determination which later seems so inevitable?

There is no escape from the fact of such determination, but the question remains, Is it purely dynamic, or is it logical? Are there inherent archætypal forms which have determined the sequence of development, or is progress the outcome of logical evolution? Pure chance is utterly unavailable, for it is always effacing its own productions, the chances always being greater against any logical combination than for it.

But can thought in any proper sense direct energy? In our experience it certainly can and does. If not,

why do we think before acting? why is perception essential to the realisation of certain ends? why is the thought of the architect necessary to the perfection of his building? The Italian anthropologist Sergi[1] has well sustained the thesis, that consciousness is a means of protection to a living organism. He has laid down the law, that, in proportion to the clearness with which the facts of relation between a living being and the conditions of external existence are apprehended, protection becomes possible to this being. The central organs regulate the apparatus of defence and flight, and by these means self-protection is possible. But the unconscious animal can neither flee from nor resist its enemy. The conscious animal, however, has a constant prevision of danger. It foresees, and through its foresight avoids impending danger. Consciousness, therefore, is a protective power in the life of an organism. But how can it be a protection unless it can in some way direct and guide the organism? If it can do this, thought can in some way direct energy. Or, to abide by the most rigid induction of facts, a conscious being can do what an unconscious being cannot do.

But here it will be said, there is no conscious being, except organisms in the animal series, and hence there has been no prevision of ends in the

[1] G. Sergi, *L' Origine dei Fenomeni Psychici*, p. 93.

development of organisms. There is no cosmic architect, except the product of our imaginations anthropomorphically extending our human mode of thinking and acting to the universe as a whole. It is true, that we cannot legitimately place such a Being beyond the universe as its architect, existing outside of it and determining it by impact from without; for, if we should admit such an extra-cosmic architect as the maker of the universe, there would be the same logical necessity of inventing another architect to account for this one, and so on in an infinite series. But such an illegitimate procedure is unnecessary. Let us abide by what is contained in the facts of experience, namely, *that the objects of our thought may be modified by the determinations of thought.*

Every work of human art is an example of real objects modified by conscious thought. Why may not cosmic thought also modify its objects? In all our planning and constructing we neither create nor destroy a molecule of matter, we neither increase nor diminish the amount of energy in the world; but we effectually modify its forms, and cause it to serve our ends. Our art is the work of immanent teleology. Objective progress is intelligible to us only as we ascribe it to an immanent telic determination.

Psychic and Physical "Reciprocity."

But the persistent critic will say, admitting that there is in our consciousness an activity which we call "will," this is but the psychic aspect of some mode of physical energy. It depends upon the food-supply, and upon a score of physiological conditions, whether or not this "will" exists. A sick man has little of it, and as by taking thought we cannot add one cubit to our stature, so by mere thinking we cannot accomplish anything. If "will" is in any sense to be correlated with force, it must be one of its modes.

We might with equal truth reply, if energy can in any way influence thought, it must be one of its modes. This raises the question, Is there any reciprocity between the physical and the psychic aspects of experience? What "reciprocity" can be conceived? If we regard them as separated, we perform an act of abstraction, severing two qualities which experience always shows to be united, and set them over against each other as divorced objects, which is plainly illegitimate. The result is only verbal, not real. We cannot make this separation real. Under what form shall the psychic aspect be conceived? It is not an element of an object, but of a subject. To figure it as objective, is to destroy

its intrinsic character and transmute it into what it is not. It is to regard a subjective fact as a material object, — the grossest logical crime of the process of abstraction. Thus abstracted, it evades us and cannot be analysed, because we have left the reality and are operating upon a mere symbol. And this is equally true of the physical aspect also. Sunder it from the subject who apprehends it, float it off from its psychic relations, and you dismiss it from thought altogether, it is non-existent for thought; for, by the hypothesis, we have attempted to unthink it. So long as you continue to think about it, it continues in relation to a subject, it is still the object of your thought. But when you cease thinking about it, what is it? You can make no affirmation concerning it; for you, it has ceased to be. You may transform it, dissolve it, compound it, practise all the arts of logic upon it, but there it is, still the object of your thought. To destroy it, you must cease altogether to think about it. But you cannot cease to think about it. Whenever you resume thinking, the last ashes of it blow up in your face to remind you that you cannot think out of existence any object of thought whatever.

As we have seen, the idea of "reciprocity" has meaning only as a mutual relation between objects; and, therefore, has no application to the subjective

and objective aspects of experience. We cannot intrude the causal relation between the concave and the convex sides of a line. Neither side causes the other. Both are manifestations of the same line, but still they are different manifestations. The cause of both is to be found in the moving point which generates the line. The illustration is inadequate, but it may be serviceable. The mystery of energy and the mystery of thought are the same mystery, considered from opposite points of view. They are simply the mystery of being, which manifests itself at once as dynamical and logical, as efficient energy and telic principle. We cannot explain the essential connection between any two particles of matter or between any two ideas. We have come upon the last term when we apprehend being. It is what we find it to be. Why it is not something else, or nothing, we cannot tell. We must rest content to know it as it is.

The Imperial Will.

But is there not a necessity in the dynamical which there is not in the logical? There is an equal necessity in both. Idealism leads to determinism as inevitably as materialism. Necessity is the correlate of "law," and law is more a thought

than it is a thing. It is a uniform relation between phenomena, not an entity, not a force, but a description of how force acts. It is the expression of an imperial and constant "will."

Are we, then, to reduce all our activities, all our thoughts, to the sovereignty of this imperial "will"? Where is our individuality, where is our freedom? These are difficult questions upon any theory of human personality. But the difficulty is diminished by the reflection that no thoughtful man has ever maintained that this individuality and freedom are absolute. We are parts of a greater whole. Most of our acts are instinctive and involuntary, determined for us by heredity, environment, education, and the natural history of our own lives and habits. All are agreed in this. But is there no line that affords a demarcation to our personality, that parts us from the ebb and flow of the great ocean of existence in which we live and move and have our being? Yes, we have our own subjectivity, which is strictly private, so far as our fellows are concerned, or public only as we choose to make it so. This is ours, and this gives us individuality, enables us to count for one in the multitudinous mass of our fellow-beings. This it is which shuts us out and shuts us in, which renders us in a true sense insular in the world. We have our fundamental

rhythms, our personal equations, our private appreciations, our incommunicable joys and sorrows, our dominant ideals, our virtues and our vices; but thought, when conformed to its perfect standard, to its imperial laws, places us all under a common necessity, revealing to us common truth, in the presence of a universal Reason.

The Genesis of Individuality.

It is a matter of experience that, within a living organism, pleasurable acts tend to be repeated *because they are pleasurable*, and painful acts tend to be avoided *because they are painful*. Among organisms, the human included, those which are most capable of pleasure will make the most lively fight for life, or for the means of sustaining, prolonging, and expanding life. Survival, therefore, is in part owing to the richness of sensitive existence, and the unhappy die partly because they do not wish to live.

If these propositions are true, psychic phenomena seem to have a place in the theory of causation. If conscious states are merely the effects of a *vis a tergo*, and feeling is merely an "epi-phenomenon" that accompanies physical processes but is wholly devoid of influence, — misery and happiness, pleasure

and pain, seem not to be the causes of anything. But, if pleasure can be a motive and pain a deterrent to action, then these phenomena fall into the causal series, and play the rôle of causes as well as that of effects.

But, it may be said, pleasure and pain are only "concomitants," dependent upon the purely organic conditions which they accompany. They serve merely as signs of processes taking place in the organism. How, then, does a good laugh react beneficially upon a despondent patient, or an emotion of disappointment spoil the digestion of a dinner? The laugh, it is said, is merely the expression of a nervous excitement imparted to the patient by his hearing a comic story, and this is all brought about by reviving activities in the brain through spoken words. The whole process is physical, except the emotion itself, which is purely subjective; and the good done results from a direct excitation of the nervous system and the quickening of the circulation. In the case of the bad digestion caused by disappointment, the real cause of indigestion is the deflection of the blood from the stomach to the brain by creating too much activity in the latter organ. The feeling itself is merely the shadow; but, having no substance, it cannot be a cause. It is the mere by-play of the organic process.

It is impossible to deny that the whole series of feelings accompanies the correlative series of organic states, but it is not so clear that feeling counts for nothing. We may prove, on the contrary, that even though feeling cannot exist without its physical side, it may still be, and, indeed, must be, endowed with some power to influence action. If it is related to physical energy as its effect, it must itself represent some form of that energy whose effect it is; and, therefore, this transformed energy may discharge itself in action. But this is probably not the case. As a distinguished physiologist, Professor John G. McKendrick, of Edinburgh, has said: "If we say that the chain of physical phenomena is the cause of the conscious states in the same sense as the physical phenomena in a hepatic cell are the cause of the secretion of the bile, we introduce into the chain an immaterial something and break the physical continuity of the various links; and if we think to escape the difficulty by translating the physical links themselves into states of consciousness, and practically deny the existence of the physical substratum, we are deceived by a jargon of words and reach no solution. To regard consciousness as a mode of energy is absurd." [1]

[1] John Gray McKendrick, *A Text Book of Physiology*, vol. ii, p. 536.

But if we accept the other alternative, and assume that there is no causal nexus between energy and feeling, then feeling is one aspect of a process of which energy is another aspect. But by what right is the objective series elevated to the dignity of a causative order, and the subjective series ignored as inconsequential? As different aspects of one and the same continuous process, feeling is as good a ground for the prediction of the next determination as energy is. When we arrive at the next state, we may as truly say that it was caused by a particular feeling as that it was caused by an antecedent state of energy. To illustrate: if a person has once found a certain fruit to be pleasant to the taste, the pleasure anticipated from eating such fruit may be a "motive" for buying it. It may be true, that the physical traces left in the brain from our former experience of the fruit may be aroused to activity by the sight of it, or by hearing the name of it, but we note this operation only from the subjective side, and so speak of the pleasure as the "motive" to the action. Were it not for the "feeling," the action would certainly not take place. There may be a subconscious chain of causes and effects connected with the deterrent result of a flogging, but it is the "hurt" of the punishment which keeps the boy from

repeating his offence. In the light of these facts, we cannot set aside feeling as a mere "epiphenomenon," and wholly disregard it in the development of an organism or the shaping of a life. It is the ability to have conscious states, that is, to be influenced by "motives," as distinguished from "motors," that constitutes an individual, with a "will" of its own. Such a being is essentially a subject, and is capable of acting for its own ends. When self-consciousness is added, through reflection, personality has emerged.

The Telic Functions of Pleasure and Pain.

If the specific quality of a feeling which renders it pleasurable is dependent upon a fundamental rhythm in the organism, as we have elsewhere seen, we perceive that pleasure and pain are not the products of physical energy, but of organic ratios, — that is, of a periodicity in the nervous activities. Pleasure and pain, therefore, appear to be teleological in the fullest sense, for they are means for the accomplishment of a definite end, — namely, the conservation of the organism. They are indications to consciousness, which here displays its protective utility, and especially to a rational intelligence,

which is capable of grasping the natural end and of aiding or defeating its fulfilment.

Primarily, pleasure appears as the accompaniment of two animal functions, nutrition and propagation. In the more highly developed animals, it extends to those activities which are involved in the enlargement of these functions. Locomotion, the pursuit and capture of food, and the preservation of it for future use, are accompanied with pleasurable feelings. All acquisition with reference to individual conservation is attended with a certain pleasure. In like manner, the function of propagation expands into a multitude of secondary pleasures, such as parental interest in offspring, the companionship of the sexes, and the enjoyment later produced by family and social reciprocity. Thus, pleasure is seen to be intimately connected with the preservation of the individual and the development of the species. If these activities, of which pleasure is a concomitant, were wholly intermitted, the result would be in the one case the destruction of the individual; in the other, that of the race.

In the beginnings of life at least, and even at high levels of development, pleasure as an inducement, and pain as a warning, seem to enter into the strategy of nature in the maintenance of living beings; who, although ignorant of the natural ends of action, act

from impulses which are immediate ends to them, but really only means for the realisation of the biological programme.

We see, therefore, that pleasure is not itself nature's end, but only a means for the accomplishment of something widely different, — the development of the animal world, and of each successive species. For, if pleasure is the end of nature, what are we to say of pain? Its office is plainly that of warning, while that of pleasure is one of inducement, with reference to the same end. We see, further, that pleasure is not itself a natural end, from the fact that it ceases at the point where the organ of whose exercise it is an accompaniment has accomplished a certain measure of activity, — which we must, therefore, call normal, — and beyond that point pain invariably supervenes. Normal function is attended with gratification, but pushed beyond its natural limit, the organ itself suffers injury, of which pain is usually the premonitory signal. The overworked stomach, pampered with sweets and stimulants, refuses to perform its natural work as an organ of digestion, and the whole organism is presently undermined with disease. This is true of every pleasure-giving organ in the body, and also of every faculty of the mind.

The evident end of nature, if it will be admitted

that nature may have an end, is not a hedonistic one, but the development of the living being. As the process of perfection may involve the adaptation of the individual to new conditions, and the limitation of his desires for the sake of the species as a whole, the realisation of this natural end may also involve much pain. Thus, climatic changes may bear heavily upon a generation accustomed to a tropical life, with its ample provision for bodily wants, if forced to struggle for existence in the less congenial conditions of cold and scarcity of food; and yet this may be necessary for the development of powers which will raise those who survive in the scale of being. Again, the perils and cruelties of war may multiply pains and sorrows, although necessary for the extirpation of enemies, and the preservation of a tribe may require the sacrifice of many of its members. In the emergence of a thrifty and peaceable community from a condition of militant life, such suffering seems to be inevitable.

In the light of organic and of human progress, it is impossible to maintain a hedonistic end as the one toward which natural evolution has tended. Pain and pleasure seem to be equally transitory incidents in the history of development, while new capacities and new faculties are constantly emerging as the products of this process. That sensibility increases

is, no doubt, true; but it is ever growing in refinement and delicacy; that is, in quality rather than in quantity. It tends always to become more intellectual and less gross, more cerebral and less sensual, more discriminative and less massive. The pains and pleasures of the higher senses are less voluminous but more varied than those of the lower. The tendency of development is, therefore, always away from those tumultuous orgasms which so impassion lower life, and toward that quiescent apperception which characterises all higher life.

The Incorporation of Reason.

Such a line of development is essentially a progressive embodiment of reason in sentient life. The impulse, which at the lower levels of life acts immediately and without restraint, as in the gratification of an appetite, at the higher levels is held in check by deliberation, may be neutralised by some counter-impulse, and well-being is consciously substituted as a motive in place of pleasure. The line of development not only extends from mere sensuous impulse at the base of the life-scale to reason at its summit, but with diminishing passion and increasing intelligence, an ever wider system of relationships is apprehended. Not only does egoism constantly tend

to be more and more balanced by altruism, but the larger organic relations of existence are more and more clearly perceived. Thought widens out from myself to my wife, my children, my tribe, my country, my race. Personal pleasure is thus, through the expansion of mind, more and more seen to be incidental, transitory, and mediate, while the natural end of being and acting is ever rising in dignity and enriched with significance. We come to see at last that we are not merely ends to ourselves, but means to others in every way equal to ourselves. Thus, intelligence and motive tend toward the perfect social organism, in which every part is at once a means and an end.

We can hardly escape the conviction that some sense of this organic relation of the individual to society is felt even in animals quite low in the scale. Darwin says we should "speak of their social instincts as having been developed for the general good, rather than for the general happiness of the species. The term 'general good' may be defined as the rearing of the greatest number of individuals in full vigour and health, with all their faculties perfect, under the conditions to which they are subjected." [1] The lower creatures may not be distinctly conscious of this, although they sometimes appear to be vaguely

[1] Charles Darwin, *The Descent of Man*, pp. 120, 121.

so; as when an animal wavers between a selfish and a social impulse, and at last overcomes its appetite by its affection. But, if this devotion to the "general good" be purely instinctive, and not in any degree consciously purposed, then all the more plainly it indicates the natural end of action to be not pleasure, but the well-being of the species.

Hedonism and Pessimism.

But what "well-being," it may be asked, can there be for a species, except the pleasure or happiness of the individuals composing it? This is to imply that, after all, some mode of sensibility is the only conceivable end of being. Granting that it is so, development may be more important than any present mode of sensibility, because it may lead to sensibility of a higher kind. It may be desirable to sacrifice quantity for quality, as John Stuart Mill held, and as natural development actually seems to do. But what is to serve as a standard for this progressive gradation, for this rising scale of qualities, whereby one state of feeling is pronounced "higher" than another? Pleasure, simply as pleasure, can be measured by the standard of quantity only; and, if pleasures are capable of classification as being "higher" and "lower," it must be with reference to something

other than pleasure. By common consent, men regard the pleasures of the intellect as "higher" than the pleasures of sense. But why? Certainly not because the former are more massive. Nor can it be because they are more lasting, for with moderation in indulgence, an appetite may be kept in repair as long as a mental faculty, so far as our observation extends. If sensuous gratification could be shown to be more lasting than intellectual, this would not suffice to make it "higher." It would still be a measurement in quantitative terms, with time entering as a factor.

In a negative way, the pessimist contributes to the solution of this problem. He says that, when he tries to formulate the equation of sentient existence, he finds that the pain exceeds the pleasure of life. Therefore, he argues, we should will not to be, and extinction is to be desired and promoted. But he is not responsive to his own logic. If his premises and his conclusion are correct, he should logically commit suicide, which he does not do. But his hesitation betrays his own suspicion of the unsoundness of his premises. He clings to existence, although he declares he suffers more than he enjoys. Why should he do so, unless there be some other end of existence than a balance of pleasure over pain? Evidently because, even though he finds pleasure not to be the

actual end of nature, he is restrained by some other motive. What is this restraining power? It is the "will to live," which is so strong within him that he does not dare or choose to die. But if this "will to live" is so strong, notwithstanding the balance of pain over pleasure, there must be some goal of being that lies outside of and beyond mere pleasure. His testimony then, when analysed, turns out to be, that there is some end besides pleasure imposed by nature upon mortals, something else that may serve as a motive to living.

Men do not discover this end in what they are, but in what they may become. The very fact that pleasure is desired, shows that they are imperfect beings. But this imperfection, which they are ever trying to supplement by gratification, development is ever supplementing by growth. As new powers emerge, however, they seek more gratification, because they still pursue pleasure as the end. But nature is always intimating that this is not the end. And thus, as long as men are absorbed in pleasure, they sink into lower and lower depths of pessimism. It is a notable fact that, in the century of human history in which man has received the highest intellectual development, he has elaborated the most bitter and despairing theory of life.

Freedom through Reason.

The only remedy for such pessimism is, to look away from the false premise, that pleasure is the ultimate end of action, and to seek the natural goal. What other goal is indicated? Here the human consciousness speaks, and has long spoken, with authority. Its answer is, "Duty." The true law of the will is not to follow the direction of least resistance, but the line of greatest resistance. What we "ought" to do, is not what gives us pleasure, but what gives us nobility. There are ideals in the human mind which seem struggling for realisation in human life. What "ought" to be, is as much a part of the rational order as what "is." We are not only ever confronted with a Dynamic Reason, but we are conscious that we are the mediums through which its uncompleted processes are to be realised. Such is, in substance, the answer of all who have troubled themselves with the question, What ought men to do? Pleasure is seen to be a means, not an end; and when the end is perceived, pleasure is known as optional, not obligatory. The natural goal of the will, therefore, seems to be a state of being in which reason is incorporated into life, and its law is the subjection of the whole man to the process of development by which this end is attained.

Here emerges the question of "freedom," which has no interest for any other than a rational being, who alone can conceive of it. It can have no other meaning than this: Can conduct be determined by the laws of reason? If it cannot, there is no such state as "freedom." The individual is bound by the impulses of his nature to act under their constraint. But if it can, the being possessing reason may emancipate his life from the dominion of blind impulses, which enslave all irrational and instinctive life.

The answer to this question must depend largely upon the meaning that is given to "reason." If we understand by it a "regulative faculty," a power to apprehend universal truth, in the light of which we may act, as we act in the light of other truth, it is evident that "reason" not only can but does determine conduct. It may be difficult to trace the complex net-work of causes and effects through which an engineer, seeing a danger-signal, immediately shuts off steam and reverses his engine; and it is still more difficult to explain how abstract truth may be translated into action, but in both cases the fact is unquestionable. Fouilleé has endeavoured to show that it is accomplished through "idea-forces," the idea of freedom itself implying the power to act freely. But, however this may be, there can be no break in the chain of causation, and we must look

for the presence of a real determination. Conscience is ever reminding us that we have not always acted from the highest motive from which we might have acted. The pain of remorse indicates that there were energies ready to act which were suppressed with our consent, as if the engineer had not heeded the signal. We perceive that the animal has been stronger than the man, and we have not attained the highest level of our possibilities. This nascent goodness within us is ever rebuking our base survivals. Can "sin" be anything else than the missing of the mark of our high calling? The wise Greeks named it "missing-the-mark." Can "holiness" be anything else than "wholeness," the realisation of the best possibilities of our type of being? The "imperious word ought," as Darwin called it, cannot be expunged from our vocabulary, for we know that, as rational beings, we should obey the rule of reason.

All this is implied in rational self-direction, but it leaves unsolved the problem of self-direction itself. Physiologically, the nervous system of man, through which all intelligent movement is mediated, is a hierarchy whose lowest members are the simplest in structure and the most elementary in function. These are overlaid by successive layers of more and more complex, unstable, and highly organised tissues, until the most delicate and finely poised of all are

reached in the motor centres of the brain. As in an army, each officer commands a number of men proportioned to his rank in a scale of ascending authority, until the commander-in-chief is reached, who can put the whole mass of men in motion by his word, so all motor organs in the body are subordinated to the highest centres of ideation in the brain. Insanity often illustrates the reality of this subordination by disturbing progressively first the higher and afterward the lower functions, so that one after another of the centres of motor activity is liberated from the control of its superior, and breaks out in lawlessness and anarchy. Each of the successive layers is controlled by the one next above it, and all are regulated by the centres of highest perception. In so far as this control is purely dynamic, it is merely a matter of organisation. But it is not purely dynamic, for the principles of action are truths perceived with their logical implications. The crown of the whole system of activities is reason, a power which is regulative because it is perceptive of truth. If this be denied, if it be alleged that the apprehension of truth is not effective in the determination of conduct, that reason is merely a powerless form of intuition devoid of regulative efficiency, — all attempts to know, all endeavours to argue, all efforts to instruct, must be utterly futile. Our whole experience, however, shows

that they are not futile. The testimony of consciousness is, that energy is guided by rational principles; or, if another way of stating the case is preferred, that reason is dynamic. But it is not of reason floated off from its organic relations, that this may be said. It is not reason as a hypostasised form of consciousness which can thus direct conduct. It is reason as the concrete unity of organised energy.

Why, then, is reason not uniformly triumphant? What is the explanation of fallacy in thought and irrationality in conduct? This must be sought in the nature of individuality. Penetrated by and constituted of energy essentially rational, the individual may fall short of rationality in both judgment and conduct, and it is precisely *because* of individuality, sundered from its larger organic relations. If the words of a sentence could be actuated by private impulses, they might fall into such relations as to express the wildest nonsense, or nothing at all. There is a fragment of truth in every error, a fragment of good in every vice. Error is a term in the system of reality detached from its connections and artificially misplaced. Vice is a natural impulse isolated from its natural end, directed toward an individual end, and developed to excess. Both may result from defect of faculty, but they may also result from the self-determination of a being capable of setting up its

own ends. Every man is a microcosm, in which subjective predilection may generate an individual order of ideas and activities. An exaggerated fragment of truth may destroy the perspective of things and relations in an individual mind. This may stop at misconception, or it may amount to hallucination. An appetite may become so dominant as to frustrate its natural end, and distort other activities. Thus, reason fails in individual lives, and the fallacious, the arbitrary, the vicious, come into existence. Heredity tends to confirm idiosyncrasies, when the conditions are favourable, but many tendencies are neutralised and obliterated by the mixture of opposites. Thus infancy, in part, restores the lost balance of nature, and erases the complexities and abolishes the defects of acquired characters. Extremes are in themselves self-destructive, so that insanity and excessive vice tend toward extinction. A broad middle ground, however, is left for variations; but pure rationality, absolute conformity to reason, is the rare exception.

Education, however, which is usually the gift of the best, seldom of the worst, is favourable to rational development, when it is free from the intention to pervert; and hence it is a great factor in both intellectual and moral progress. It is injurious only when used as an agent for propagating erroneous and decaying ideas, as it sometimes is; but,

as these are ill adapted to persistence, the effect of such education is relatively short-lived. Natural selection, which must be regarded as rational selection, is constantly eliminating the foolish and the bad, and establishing the truly wise and good; and thus the will of humanity is progressively conformed more and more to the universal Reason.

VII.

THE GENESIS OF ART.

GOETHE says that art is called art simply because it is not nature. Unquestionably, it has its impulse and its laws in the constitution of man. We may, therefore, accept as useful to the proper comprehension of it, in its most general sense, the definition given by Thomas Davidson: "Art is an expression of man's inner nature imprinted upon matter, so as to appeal to his senses, which deal only with matter, and through which he obtains experience."[1] But, while every product of art is the work of human personality, neither man nor his works can be understood, or even intelligently considered, separate from nature. He is himself a part of her, and yet he is different from any inferior part, for he alone can, in any degree, fathom the depths of natural process or formulate natural law. When, therefore, we say with the great poet-philosopher, that art is called art

[1] Thomas Davidson, Lecture on the Evolution of Sculpture, before the Brooklyn Ethical Association, p. 2.

simply because it is not nature, we cannot mean that art is in no sense a natural activity. On the contrary, while we must accept the antithesis, we must still seek the explanation of the origin and development of art in the operation of the natural forces which are present, and the natural laws which are dominant, in the nature of man; for he, although he is nature's child, has come into possessions which are his own.

The faculty of artistic production, aided indeed by all the other powers of man's nature, under its guidance and command, is imagination. This is the combining faculty which, like an informing spirit, shapes the pre-existent elements and proximate forms of nature for human needs and human pleasure. Its stimulus comes from the sphere of feeling, but its products are not the organic consequences of this stimulation. If they bore this relation of necessary effect to feeling as organic cause, they would be in the fullest sense the products of nature, and the distinction between nature and art would be effaced. But, in fact, the whole of man's being as rational intelligence intervenes between the impulse of feeling and the work of art. This is probably what Wilhelm von Humboldt intended when he said, "Art is the faculty of making imagination productive, according to law."

The Arts of Life and the Arts of Pleasure.

The primary impulse to imaginative activity is *utility*, the satisfaction of distinct vital needs. Of these the first is that of food, universal and peremptory for all living beings. Then shelter, clothing, weapons of defence and attack, implements and utensils of various kinds, are demanded. In the lower animals, instinct directs the creature how to satisfy the simple organic needs; but in man, even with a low degree of intelligence, imagination contrives new ways and means of supplying these requirements. A sharpened flint serves as a knife; attached to a wooden handle, it becomes a spear; projected from a bow-string, it is an arrow. Thus, along lines of very gradual ascent, all the complicated equipment of home and chase and war was slowly acquired by the constant search for better means with which to accomplish necessary ends. In all invention, from the stone-axe to the telephone, imagination has been the active faculty. The impulse of utility, "making imagination productive," has generated the "useful," "industrial," or "economic" arts; or, as the anthropologist Tylor calls them, the "arts of life."

A secondary impulse to imaginative activity is the *sense of freedom*, the satisfaction derived from

a free exercise of power. After the strictly vital needs of the body are provided for, unless the whole store of force is exhausted in satisfying them, there remains a surplus, especially in the unused organs, which impels to activity not directed toward useful ends. The pressure of this exuberant energy for expression is, probably, the primitive impulse toward the decorative, representative, and imitative arts. These are called the "fine arts," the "æsthetic arts," and by Tylor the "arts of pleasure." In many languages they are designated as the "beautiful arts," — the Italian name being *belli arti;* the French, *beaux arts;* the German, *schöne Künste.* To these forms of art we shall confine the remainder of our discussion.

The Play-impulse.

Herbert Spencer begins the last chapter of his *Principles of Psychology*, with the following allusion: —

"Many years ago I met with a quotation from a German author to the effect that the æsthetic sentiments originate from the play-impulse. I do not remember the name of the author; and if any reasons were given for this statement, or any inferences drawn from it, I cannot recall them. But the statement itself has remained with me, as being

one which, if not literally true, is yet the adumbration of a truth." The author referred to is the poet Schiller, and the writing in which the idea cited by Spencer occurs is Schiller's *Letters on the Æsthetic Education of Man.* What Schiller is attempting to explain is not the origin of the "æsthetic sentiments," but the nature of man as an art-producing being. This nature, he thinks, grows out of the union of two impulses: (1) the *sense-impulse* (*Stofftrieb*), which determines that there shall be constant change, that time shall have a content; and (2) the *form-impulse* (*Formtrieb*), which determines that time shall be abolished, that there shall be no change. From the union of these two impulses in man results the *play-impulse* (*Spieltrieb*), which tends to abolish time in time, and to unify becoming with absolute being, change with identity. But we must not expose ourselves too long in the rarefied air of even a poet's metaphysics. Spencer, without knowing his teacher, and kindling his torch with the stray spark of Schiller's flash upon the clouds, has shed more light upon the origin of art than the poet himself.

"The activities we call play," he says, "are united with the æsthetic activities, by the trait that neither subserve, in any direct way, the processes conducive to life. . . . Inferior kinds of animals

have in common the trait, that all their forces are expended in fulfilling functions essential to the maintenance of life. They are unceasingly occupied in searching for food, in escaping from enemies, in forming places of shelter, and in making preparations for progeny. But, as we ascend to animals of high types, having faculties more efficient and more numerous, we begin to find that time and strength are not wholly absorbed in providing for immediate needs. Better nutrition, gained by superiority, occasionally yields a surplus of vigour. The appetites being satisfied, there is no craving which directs the overflowing energies to the pursuit of more prey, or to the satisfaction of some pressing want. The greater variety of faculty commonly joined with this greater efficiency of faculty has a kindred result. When there have been developed many powers adjusted to many requirements, they cannot all act at once; now the circumstances call these into exercise and now those, and some of them occasionally remain unexercised for considerable periods. Thus it happens that, in the more evolved creatures, there often recurs an energy somewhat in excess of immediate needs, and there comes also such rest, now of this faculty and now of that, as permits the bringing of it up to a state of high efficiency by the repair which follows waste.

. . . Every one of the mental powers, then, being subject to this law, that its organ when dormant for an interval longer than ordinary becomes unusually ready to act — unusually ready to have its correlative feelings aroused, giving an unusual readiness to enter upon all the correlative activities, it happens that a simulation of those activities is easily fallen into, when circumstances offer it, in place of the real activities. Hence play of all kinds — hence this tendency to superfluous and useless exercise of faculties that have been quiescent." The surplus of energy passes into aimless action. He goes on to say: "A cat, with claws and appended muscles adjusted to daily action in catching prey, but now leading a life that is but in a small degree predatory, has a craving to exercise these parts; and may be seen to satisfy the craving by stretching out her legs, protruding her claws, and pulling at some such surface as the covering of a chair or the bark of a tree. . . . This useless activity of unused organs, which in such cases hardly rises to what we call play, passes into play ordinarily so called where there is a more manifest union of feeling with the action. Play is equally an artificial exercise of powers which, in default of their natural exercise, become so ready to discharge that they relieve themselves by simulated actions

in place of real actions. For dogs and other predatory creatures show us unmistakably that their play consists of mimic chase and mimic fighting — they pursue one another, they try to overthrow one another, they bite one another as much as they dare. And so with the kitten running after a cotton-ball, making it roll and again catching it, crouching as though in ambush and then leaping on it, we see that the whole sport is a dramatising of the pursuit of prey — an ideal satisfaction for the destructive instincts in the absence of real satisfaction for them."[1] The plays of children carry these low beginnings to a higher state. Spencer thinks that gratification from a victory at chess is a substitute for ruder victories of an earlier time. The banter of a playful conversation is also a mimic battle, in which words take the place of coarser weapons.

It would be absurd, of course, to pretend that such play is in any sense fine art; but we may see in it the impulse that sets the faculties in motion for the highest artistic productions. This we shall presently undertake to illustrate in tracing the development of the arts. As a preliminary to this, we may note the marks of differentiation which distinguish the arts of pleasure from the arts of life. (1) The practice of the useful arts is accompanied by a sense of

[1] Herbert Spencer, *Principles of Psychology*, vol. ii, p. 630.

necessity, growing out of the constant feeling that the process is a serious one. That of the arts of pleasure is attended with a sense of *freedom*, resulting from the surcharge of energy directed toward less indispensable issues. (2) The useful arts derive their laws and limitations predominantly from the *objective* world. The fine arts derive theirs more largely from the *subjective* world. (3) The useful arts, therefore, partake of the *uniformity* of physical law, with its consequent monotony, so much felt in work. The fine arts, on the other hand, permit of more *novelty* and *variety*, as experienced in play.

Although the play-impulse is at the foundation of the æsthetic arts, it does not follow that art is merely the product of this impulse. Play stimulates free imaginative activity, which creates a world of its own. And we must not forget that man is not simply an imaginative, but also a rational, being. The reaction of reason impresses upon the spontaneous activities the characteristics of reason as a regulative faculty,—unity, order, and proportion. Thus poetry, which was at first merely the spontaneous rhythmic expression of excited feeling, with little restraint of law and almost unlimited license, is modulated at last to the stringent requirements of exact metre, a prescribed sequence of feet, and the artifice of terminal rhyme. The interval between the first

wild lyric of prehistoric man and the chastened symmetry of the modern sonnet, is measured by the whole diameter of human culture.

The Classification of the Fine Arts.

In order to approach intelligently the development of the fine arts, it is important for us to form a clear idea of what should be included under this designation, and to classify this material according to some principle. We may, for this purpose, start with the classification of a recent and highly competent French writer upon the subject, M. Eugène Véron. He says: "By their origin and the nature of their processes, the arts naturally divide themselves into two well-defined groups. The one springs from the sensation of sight, and is more or less immediately connected with the practices of primitive scribes. The three arts of which it is composed, are sculpture, painting, and architecture. Their common feature is development in space; their manifestations have to do with a single point of time: consequently, they exclude movement, which is succession and duration, replacing it by simultaneity and order, whose law is proportion. The other three arts, poetry, music, and the dance, are subject to the laws of rhythm. They have sound for their vehicle of

expression, they appeal to the sense of hearing, and take their immediate origin from spoken language, which seems for long to have consisted of a species of cadenced singing. Their principle of action is by succession, through which they are referred to general ideas of lapse of time and movement. They are, therefore, the more direct expression of the inner essence of life; while the other three deal with it rather in its exterior forms — which, being expressed at one given moment of their action, become, as it were, disguised by the very necessity under which they labour to limit themselves to a definite attitude, depriving them of the most salient characteristic of the other group of arts, — movement and power of change."[1] He then offers the following classification: —

I. *Arts of the eye:* Architecture, Sculpture, Painting.
II. *Arts of the ear:* Dancing, Music, Poetry.

We may accept this as the basis of a grouping of the fine arts, but it should be revised in the light of two considerations; first, it is a mixed classification, for dancing does not appeal to us through the ear only, as Véron asserts, but partly through the eye also, in the case of a spectator, but mainly through the muscular sense; and second, it is a grouping that entirely ignores the genetic process by which

[1] Eugène Véron, *Æsthetique*, p. 29.

the several arts are evolved, if not out of one another, at least in a definite order of sequence. Both of these objections are fully met, and in addition each of the arts is characterised by its own distinctive peculiarity, if we adopt the following arrangement: —

I. *Arts of Movement:*
1. Dancing, — rhythmic motion of the *body*.
2. Music, — rhythmic motion of the *voice*.
3. Poetry, — rhythmic motion of *speech*.

II. *Arts of Form:*
1. Architecture, — *decorative* form-construction.
2. Sculpture, — *representative* form-construction.
3. Painting, — *imitative* form-construction.

A few words will assist us to see that this classification is a scientific one. In distinguishing between the arts of movement and the arts of form, we retain every advantage of Véron's scheme without a strained reference of the figures of the dance to the ear instead of to the eye and the muscular sense, and at the same time do not obscure the close affiliation between dancing and music, which most obviously exists. The revised grouping also specifies the peculiar kind of movement and of form-construction exemplified by each art. We further recognise in architecture its beginning as one of the useful arts,

which, as mere form-construction, it does not surpass. But when decoration is added, or rather when the decorative purpose pervades the entire plan and execution of architectural form, then for the first it becomes a fine art. The peculiarity of sculpture is, that it is representative form-construction, endeavouring to copy literally, or to represent fully, the object of the sculptor's work. In the earliest sculpture, as we have no inconsiderable evidence to show, even colour was employed, and this in a truly representative way, reproducing the colours of the parts represented. Painting is not strictly representative, but imitative, striving to present on a flat surface, with only two dimensions, objects which in reality occupy three dimensions of space. By the arts of perspective and foreshortening this aim is in a great degree accomplished, so that a result is produced which is *like* the original, but not in all respects, even from an exterior and visual point of view, the *same* as the original.

It remains now to show that the grouping offered here observes the genetic principle, and arranges the fine arts in the order of their natural sequence and evolution. Véron denies that this is possible, but this conclusion cannot be maintained. It is true that we have not in our possession the earliest products of art, so as to be able to prove that any order

which we may assign is the actual order of development, but we have the means of showing that the order we have indicated is highly natural and probable. As regards the two main divisions, it is clear that the arts of movement would precede the arts of form; for the arts of movement, — dancing, music, and poetry, — may all be practised by man without external aids or instruments of any kind, while this is impossible for the arts of form, — architecture, sculpture, and painting. We might also cite, in confirmation of this view, the facts derived from the comparative study of man, which show that the arts of movement are practised among peoples who have no arts of form, or possess these in a less perfect state of advancement than those of the first group. As regards the particular arts embraced in the general scheme, the dance seems to be the most primitive of all, because it is a simple rhythm of the bodily movements, which requires nothing else than free limbs and a tendency to bring unused muscles into exercise. The rhythm of bodily motion is naturally accompanied by vocal rhythm, which is rudimentary music, and when to this, articulate words are added, poetry has begun, although in a very elementary way. As soon as the place where the dance is held begins to be decorated, the building art blossoms into a primitive architecture. When

masks are used to represent deities or absent men, or representative figures of these are set up as objects of worship or reverence in the dance, — sculpture has its beginning. When such effigies are imitated on a flat surface, by applying the pigments first used upon the bodies of the dancers and then on the graven images, — painting as a fine art has its humble origin. Thus, we perceive, there is a natural sequence in the advent of the several arts.

The Prehistoric Origin of the Fine Arts.

It is idle to speculate upon the question as to when the fine arts had their origin. As Véron says: "Art came before thought itself. Before he ever attempted to understand or explain the conditions of the world in which he lived, man, open to pleasure through his eyes and ears, sought in combinations of forms, sounds, movements, shadow and light, for certain special enjoyments. Traces of these early aspirations are extant in the recently discovered works of a time when his intellectual activity must have been confined within a very narrow scope. . . . When as yet he possessed neither laws nor social institutions, even then he had art. In the dark caverns which formed his first habitations, because they alone could protect him

against the attacks of beasts of prey, amid the piles of bones in which have been found the débris of species vanished from the earth perhaps a thousand centuries ago, we have discovered, among flint-formed arrows and knives, objects which could evidently only have been ornaments, necklets, bracelets, rings of stone and of bone, — more or less roughly worked and fitted indeed, but enough to show that art is not, as has been asserted, the efflorescence of superior civilisations only. . . . Yes, those savages, who lived dispersed in the holes and corners of the world . . . already felt the sentiment of art. They strove after beauty; they adorned with their best their appalling females; they decorated their weapons of stone; they devised musical instruments; by means of gravers of flint they cut upon flat bones the leading features of many animals, with enough accuracy to enable us to this day to recognise their species."

The Priority of the Festal Dance.

It may create some surprise that we regard the dance as the earliest form of art, or even that we allow it any place among the fine arts. To many it will seem a kind of sacrilege to combine in the same category, however broad, such extremes as a dancing savage and a painting of the last judgment;

and, if the connection must be made, some would choose to make it along other lines than those of art. But, in truth, the dance supplies us with the key, so to speak, of the development of the fine arts. For light upon the problems of human culture, we naturally appeal to the anthropologist. "Dancing," says Tylor, "may seem to us moderns a frivolous amusement; but in the infancy of civilisation it was full of passionate and solemn meaning. Savages and barbarians dance their joy and sorrow, their love and rage, even their magic and religion. The forest Indians of Brazil, whose sluggish temper few other excitements can stir, rouse themselves at their moonlight gatherings, when, rattle in hand, they stamp in one-two-three time round the great earthen pot of intoxicating Kawi-liquor; or men and women dance a rude courting dance, advancing in lines with a kind of primitive polka-step; or the ferocious war-dance is performed by armed warriors in paint, marching in ranks hither and thither with a growling chant terrific to hear."[1] Tylor proceeds to describe the dance of the Australians, and the buffalo-dance of the Mandan Indians, who, wearing masks to mark their impersonations, with rude songs and pantomimic gestures, act out the incidents of an imaginary hunt. And then he adds: "All this

[1] E. B. Tylor, *Anthropology*, p. 296.

explains how, in ancient religion, dancing came to be one of the chief acts of worship. Religious processions went with song and dance to the Egyptian temples, and Plato said that all dancing ought to be thus an act of religion. In fact, it was so to a great extent in Greece, as where the Cretan chorus, moving in measured pace, sang hymns to Apollo, and in Rome, where the Salian priests sang and danced, beating their shields, along the streets at the yearly festival of Mars. Modern civilisation, in which sacred music flourishes more than ever, has mostly cut off the sacred dance. To see this near its old state, the traveller may visit the temples of India, or among the lamas of Thibet watch the mummers in animal masks dancing the demons out, or the new year in, to wild music of drums and shell-trumpets. Remnants of such ceremonies, come down from the religion of England before Christian times, are still sometimes to be seen in the dances of boys and girls round the Mid-summer bonfire, or of the mummers at Yule-tide; but even these are dying out."[1]

The writers on the origin of the drama derive the tragedy of Greece, and indeed the dramatic art of the world, from simple mimetic dances, such as Tylor has described, which are found among all savage

[1] *Id.* p. 297.

races. As Ellen Russell Emerson has said, in her curious book, *Masks, Heads, and Faces:* "Panoplied with the mask, representative of deity, the actor in religious rite, with careful step moved in the order of the ceremonial. In the Innuit robe of evergreen boughs, or in the garment of tufted grass of the Dorian mummer, his countenance disguised with lees of wine or painted with ochre, he danced in enthusiastic mimicry of his divinity. Innuit or Greek, the same aspirations attuned the cythara or drum, the same ambition dictated the wild or solemn movement. Wheeling in weird rotation, the Seleni and satyrs encircled the blazing altar on the plains of Greece. The cytharist struck the measures which the mimic gestures of the chorus emphasised. Spring-time, autumn, or winter, these wild ceremonies were performed in praise or appeal to the gods, in the lands of the East and of the West. With both peoples the principal object was, to anthropomorphise the divinity dwelling in air or earth. Holding forth innumerable arms of appeal, barbaric Indian and barbaric Greek called on the coming of the gods."[1]

If now we pause for a moment to consider the conditions of primitive society, we shall see that they

[1] Ellen Russell Emerson, *Masks, Heads, and Faces*, pp. 262, 263.

were not such as to favour the cultivation of the independent arts, like sculpture and painting, or even architecture. The play-time of primitive men was not long enough for this. But the recurrent festival, celebrating some exploit in the chase or in war, or commemorating some departed chief, would furnish an occasion toward which men would look, for which they would prepare, and in which they would experience that pleasure which the excitement of a crowd affords, especially to the dependent mind without resources of its own. Accordingly, it is in the festival that we must seek for those conditions in which early art was developed, and we shall find that this is true to a surprising extent of later art also. Among primitive peoples, with very little leisure and with almost no wealth, art can develop, beyond the mere decoration of the person and the ornamentation of personal weapons, only in a social and festal way. But, as leisure and wealth increase, art rises to bolder heights, especially if the faculty for art-production be native among the people.

The Drama as the Continuous Synthesis of the Arts.

We have seen that even the domestic animals, like cats and dogs, "dramatise" in their play. So do children in their sports. The mimetic dance carries

this on another step, involving the representation of characters, absent or superhuman, and the reproduction of ideal scenes. As intelligence and skill increase, this becomes more and more removed from the simple beginnings. The Attic ceremonials in their origin were merely crude efforts at dramatisation, but with advancing culture the spectacles became more elaborate. There is an interval between the dance of the Brazilian Indians around their earthen pot of smoking Kawi-liquor and the Attic festival of Bacchus, performed in a great marble theatre, or temple of Bacchus, with a sculptured statue of the god in the centre, the full chorus chanting to the accompaniment of many instruments, the walls of the temple adorned with heroic-size paintings of the exploits of the divinity; — but it is only the interval between the first and the middle chapter of the same history. If, in a great modern city like Paris, we were to select the places where *all* the fine arts are most fully represented at once, we should not choose the palaces and the museums, for here the arts of movement are not represented, but the great churches and play-houses, especially Nôtre Dame and the Grand Opera House. In Nôtre Dame, we should find music, poetry, architecture, sculpture, and painting, — all combined. Only dancing is eliminated, as an outgrown element of cere-

monial. In the Grand Opera House, we should find *all* the arts, and the one omitted at Nôtre Dame would be most conspicuous there. The festal dramas of early times have been specialised, the religious ceremonial being separated from the secular, which finds its modern equivalent in the opera, where all the arts remain united. It is not meant that the *best* art in Paris is to be found at the Opera House, but it is the kind which at the present time best represents the art-appreciation of that city. Its attractions are offered every night, those of the *salon* once a year.

However paradoxical it may seem at first, reflection confirms the statement that the drama is the synthesis of all the fine arts, and the festival the common air, from which all have drawn their first breath of life. If we start with the opera, for example, as a present fact, and inquire when and how it combined in itself the separate arts which it certainly unites, — we shall find no point where these arts, independently developed, were first brought together for this purpose. We shall find, on the contrary, that every form of the drama was derived from some simpler form in which all the arts were constituents, until we arrive at the mimetic dance as the prototype of the whole series of dramatic phases. We are by no means justified in supposing that, at some time in the past, near

or remote, a sculptor, without predecessors or examples, inspired by the impulse of a divine genius, modelled for himself a perfect human form in clay, and then with chisel and hammer proceeded to disengage a copy of this form from the solid marble. As little can we suppose that a great painter, without antecedents or training, arose in the midst of an inartistic generation, stretched his canvas, mixed for the first time his pigments, and executed a landscape or an ideal head. This is not in analogy with other lines of human development. As every great orator was once a speechless infant, finding language ready for his tongue, and comprehension in his hearers, so every great artist has found a language of artistic expression waiting for his genius to improve and lovers of art ready to enjoy his creations. And thus, we see, that, as the mechanic arts do not blush to confess that every wheel in every watch and every factory owes its parentage to the discovery that a fallen tree-trunk will roll under pressure, which probably first revealed the principle of the wheel, — so the fine arts need not be ashamed of their descent from the mimetic dance. Let no idealistic devotee of art, therefore, be shocked or offended, if we say that all the fine arts were at first incidental contributions to the dramatic festival, and afterward were analysed out of this common medium of their development as independent forms of culture.

The Relation of the Separate Arts to the Festival.

In all dramatisation music has had a large place, either as the recurrent drum-tap, the percussion of cymbals, the twanging of stringed instruments like the tetrachord of the Greeks, or the blowing of pipes and horns. Between the intervals of dancing it is common in primitive ceremonies for some person to sing a few words alternated with a uniform chorus, — and such, it has been suggested, might be the origin of the Greek strophe and antistrophe, "which are thought to represent the two movements of the universe from east to west, and west to east, the choir performing their dances around the altar of their gods from right to left and left to right." Thus was developed a lyric which gradually expanded into a poetic story. This, in time, developed into the recital of the rhapsodists who sang at the public festivals, — which were largely dramatic in their character, — and these fragments of heroic verse united and amplified become at last great epics, like the Iliad and the Odyssey.

The relation of architecture to the festival is very easy to trace. The most ancient architectural remains are huge monoliths, undoubtedly intended as monuments of the dead. Perhaps hardly less old are the dolmens, or flat stones laid horizontally upon sev-

eral tall upright pillars; and the cromlechs, or circles of rude stones, indicating a place of assembly, or the marking-off of a sacred enclosure. All of these are probably early tombs. The tomb is, among primitive people, a place of religious festival. It becomes a shrine of the deified hero. Around it the living gather to celebrate the deeds of the dead and to invoke his blessing. The tomb-shrine gradually becomes a temple. The whole history of the development of architecture shows the shrine as the constant centre about which are arranged the pillared halls, the colonnades, the ornate portals, the ornamental courts, and the sculpture-lined avenues of the most elaborate temples. Professor G. Baldwin Brown says, in his recent manual on the fine arts: "Through a fortunate circumstance we are able to get behind these elaborate constructions, and learn the arrangements which preceded them in respect to the shrine and its furnishing forth. The pictures in the Egyptian hieroglyphic writing supply us with minute but extremely spirited delineations of structures and objects which may have been familiar to the inhabitants countless generations earlier than the erection of the tombs and temples that remain to us. Among these pictures are one or two representing small huts or arbors of rustic work. These, we learn, are shrines of the gods, and they represent the original shape of

the sacred chamber, which remained to all time as the heart and kernel of the vast temples of a Seti or a Rámeses. . . . Religious worship, it need not be said, is infinitely older than the permanent temple, and for its performance all that was needed was a gathering of the pious at a sacred spot about a rustic altar, to which might be added a movable ark, or a fixed hut or canopy for the safe keeping of any totem or apparatus of secret mummery belonging to the local divinity. Given such a permanent structure, the approach to it would be specially hallowed ground and fenced off from profane tread. Any simple device, such as a lofty flagstaff, would be adopted to give it importance from afar, and on the occasion of the festival every kind of decoration in the form of fluttering streamers, branches of green trees, and garlands of flowers, would be lavished on the building and its approaches. Here, in the little Egyptian shrine, we see at the entrance two lofty flagstaffs, and in front the indication of a palisade, evidently marking off the sacred precinct, or *temenos*. . . . Now it will be recognised that we have here, reduced to their simplest terms, just the same elements that went to make up the vast complexus of the monumental temples of Thebes or Abydos. The shrine remained as it had been, though now wrought in stone. The chambers round about it in the hinder portions of the temple

were lodgings of the priests and storerooms for the offerings of the faithful; the courts and columned halls were merely developments of the palisaded enclosure. The flagstaffs actually remained till the latest times erect on each side of the single entrance to the temple, though the idea of them was still further carried out in monumental fashion by the rearing of two vast, almost completely solid masses of masonry, of tower-like form, called *pylons*, that flanked the gateway and gave the desired imposing aspect to the approach toward the shrine." [1] The writer goes on to show that a similar account might be given of "the most important monument in the whole history of architecture, — the Temple of the Greeks."

The manner in which sculpture contributed to the festival is also obvious. In the mimetic representations which formed a part of all the primeval religious ceremonies, — and all early festivals were in some sense religious, — the mask was an important factor. Much curious and suggestive lore regarding masks in all ages is to be found in a work previously referred to on *Masks, Heads, and Faces*. The earliest disguise was effected by use of lees of wine mixed with black earth. This, applied directly to the face, served as a mask. Then vegetable shells and wood, later baked earth and

[1] G. Baldwin Brown, *The Fine Arts*, pp. 29, 33.

stone, and finally metals, served a better purpose. The object was to impersonate the absent, usually a hero or a god, or the animal in which the deity was fond of appearing. "Certain lines were traced upon the masks used in ceremonial dances, and in the protection of the face of the dead, whose meaning can be understood only by a knowledge of the customs, traditions, and superstitions of the people among whom they were used. These lines are not only found on the wooden masks, but on the terra-cotta and plaster, and also upon cocoanut and gourd masks. There is reason to believe that, in the case of the terra-cotta, the devices were fac-simile to the tattoo-marks on the face of the deceased, the mask in this case intended to insure preservation of the cherished lineaments, and also affording means of identification. . . . The custom of the use of portrait-masks survived in Roman burial service, when the lineaments were made in wax, and worn by his representative with a costume of the dead dignitary. From this ceremonial arose a more extensive fashion of carving the features in marble."[1] But the same tendency had earlier shown itself in Egypt and Assyria, and pre-eminently in Greece. Not only real but also mythic beings, first impersonated in the festival, were carved in marble for its future orna-

[1] Emerson, *Masks, Heads, and Faces*, pp. 157, 158.

ment. "The solemn representations of the gods in the circling dance about the archaic altar admitted of no irreverent hilarity. Thus were presented the movements of the sun and moon accompanied each by a retinue of lesser gods; for to the solar god were ascribed the Seleni, deities of the woodlands, and to the moon-goddess the Naiades of the flowing streams. And there appear also satyrs, those happy genii whom the sculptor had delighted to picture as the souls of the forest, unwitting of sorrow; of these human-eyed creatures the artist often chose representation in mask, with open look and parted lips, common feature of Hellenic sculpture, — an expression of unchecked animal sweetness, no muscle drawn or compressed, and with all the unalarming hint of furry ears and budding horns!"[1]

Painting, except as pigments were applied to faces, masks, and architectural adornments, had a relatively small place in the primitive festivals, as indeed it had in all ancient as compared with modern art. The whole theory of perspective was unknown, without which painting limps and halts. Still, we may see how it could contribute to the festival at a very early stage by the practice of the Sioux in their mimetic elk-dance. When the sacred animal appears to a brave in a dream, a tent is placed with

[1] *Id.* pp. 263, 264.

an opening to the east, and decorated at the top with four bands of blue, while across the entrance the figure of an elk is delineated with red paint, so arranged that the visitors shall pass through its body. Here is a crude contribution of painting to a very primitive festival. Of course the evidence concerning the extent to which painting entered into the early festal performances, can be only indirect. But it is important to note that the art of writing is derived from that of drawing, and that all the earliest forms of written language are pictographic. And they were also the special possession of the priests who had charge of the religious festival. It is more than probable that writing originated from the attempt to produce a series of pictures of early festivals, either religious or triumphal, or both, for victory was always celebrated with religious rites. Beginning thus as a series of rude imitative drawings, writing passed into more and more symbolic stages, among the Egyptians traversing the clearly marked phases of hieroglyphic, hieratic, and demotic writing, becoming the alphabet of the Phœnicians, whose crude characters were transported to Greece, and these — considerably modified — to Rome, whence we derive those letters with which we print our books and newspapers. Very early, then, was drawing known as a fine art, although

imperfectly developed. Colour was used on the earliest statuary. "The independent statue, fashioned either in stone or wood, appears in the oldest Egypt, and has about it a good deal of that crude realism which marks the infancy of representative art. The flesh is coloured up to correspond with nature, the flesh of women being tinted a lighter hue than that of men, the eyes are represented often by some special material, the drapery is painted. The earliest statues of the gods of Greece were of a similar kind, only ruder and more childish in their realism than those of Egypt. The wooden doll was made as life-like as possible by being dressed up in real clothes, with a wig of hair, and with accessories or arms in actual metalwork and jewelry." These realistic images were highly honoured from a religious point of view, as the *bambino* of the Church of Ara Cœli, in Rome, is at the present day. They were undoubtedly copied from living effigies in the festival, such as this *bambino*, which is carried in the ceremonial processions at its annual fête. Still further light is thrown upon the subject by the religious symbolism of colours among widely separated peoples. Among the Chaldeans, the planetary gods were all symbolised by colours, yellow standing for the sun; black, for the moon; red, for the planet Mars; pale yellow, for Venus; and blue, for Mercury. So among

the Indians, green is ascribed to Venus, purple to Jupiter, and black to Saturn. All this finds its easy explanation in the colour given to the representative of the god in the festal dance.

The Essential Nature of Art.

If, now, we have established our thesis, it appears that the fine arts are the various modes of expressing the strong feelings awakened by religion and other potent stimuli of the imagination, finding utterance under the social conditions of the time, and giving form in material sign and symbol to otherwise incommunicable sentiments. An analytical and philosophising age is not particularly favourable to the production of the fine arts. They thrive best among an impressible, imaginative, spectacle-loving people. All history is a witness of this. The art of Egypt is the record of its religious rites and ceremonies, its military triumphs, and its royal processions. The same is true, to a great extent, of the art of Greece. The most of its sculpture is copied from figures seen in the dance, represented in the great festal games, or in the religious celebrations of the people. The marbles once in the frieze of the Parthenon, many of which were taken to England by Lord Elgin and placed in the British Museum —

known as the "Elgin Marbles," — are copies from the Panathenaic festival, as a spectator might have beheld it, when all Athens contributed to its magnificence. The Italian *rappresentazioni*, most splendid at Florence, gave inspiration to the great painters of the fourteenth and fifteenth centuries. As these spectacles increased in beauty and artistic excellence so did the paintings copied from them, for here the painter found his living models, already works of art in personal beauty and costume. The artists actually took both their themes and characters from these pageants. The "miracle-plays" and "mysteries," their equivalents north of the Alps, were less impressive, but these also kindled the flame of art and almost created the northern painter. There was also in Italy the *trionfo*, or procession of masked and costumed mummers, representing sacred, mythical, and allegorical personages, in a blazonry of symbolic adornment. A fine description of these and how the artist worked from them, may be found in Brown's manual on the fine arts, to which reference has been made.

Artistic inspiration arises from the stimulation of the imagination, the faculty of movement and form, by some strong feeling seeking expression. Among the feelings which have been most productive of such stimulation, we may mention the religious sen-

timents, which open a limitless field for imaginative activity; the emotions of love, which stir the imagination to the delineation of human beauty; the moral sentiments, which excite it to portray the heroic and sublime qualities of character; and the delight in natural scenery, which attracts it to the representation of the beautiful in nature. All these feelings awaken a faith in some higher possibility, opening the quest for the ideal, or beauty stripped of its imperfections. Art thus becomes the appeal of personality to personality, of intelligence to intelligence. Its highest office, toward which it has been slowly striving, is to serve as a language for the embodiment and communication of ideas and sentiments which have a value for human sensibility. As Emerson has tersely said, "Art is the path of the creator to his work."

VIII.

THE GENESIS OF MORALITY.

THERE is in human life, even in its lowest types and upon its least elevated planes, a more or less conscious conformity of conduct to some standard of rectitude. This is what is meant by "morality," which in all its grades and variations uniformly exhibits this constant trait, — regard for some rule or standard of behaviour. Whatever may be said of the "immorality" of the lowest races, when their conduct is judged according to the highest criteria of duty, there is no race or tribe of men which can be justly pronounced "non-moral," — wholly deficient in those conformities to standards of rectitude in which morality, broadly considered, essentially consists.

Morality as a Human Phenomenon.

We may easily find what are called "vices" in all the races of mankind, but these are not so much the

products of distinct purpose as they are merely incidental to unregulated conduct. They are often nothing more than survivals of animal habit in the sphere of human action, and their flagrancy is chiefly owing to their persistence under the higher conditions of conduct. But what are called "virtues" — forms of conduct or dispositions of mind implying some native resolution and conscious endeavour to maintain a standard or regard a principle, — are not wanting even in the lowest types of man.

The most impartial and complete repository of the manners and customs of the lowest races is, probably, Herbert Spencer's *Descriptive Sociology*. According to this digest, Fuegian women are "modest in the presence of strangers," "affectionate towards each other," and "very fond of their children." Although the Fuegians are "arrant thieves," they are said to be "very honourable in their commercial dealings." "If any present was designed for one canoe, and it fell near another," says a traveller among them, "it was invariably given to the right owner." About the only excellence that can be ascribed to the Andamans is "parental and filial affection." The ordinary relations between the sexes are described as of the loosest character, yet when "chosen or allotted as wives, they are required to be faithful to their husbands." Among the Veddahs, "amidst ex-

treme indifference to morals," "grave crimes are rarely committed." "They are proverbially truthful and honest." In case of theft, restitution is required. "Widows are always supported by the community." "Infidelity, whether in the husband or the wife, appears to be unknown." "Death alone separates husband and wife," is one of their sayings. These three races are, with the aboriginal Australians, the lowest in existence, and what is true of them is true of all the most degraded types of man, namely, that they exhibit moral phenomena in a degree fully proportionate to the rank of their intelligence.

If we turn our attention from the present to the traces of morality afforded by the most ancient historical memorials, we find not only that conceptions of morals existed in the earliest ages of which we have any records, but that ethical ideas had at that early period attained a clearness and elevation which in some respects have not been surpassed in more recent times. If the art of ancient Egypt awakens our wonder and admiration, its high standards of morality create even greater surprise. The earliest complete treatise which we possess written by the hand of man is, probably, the manual of ethics called *The Precepts of Ptah-hotep*, composed at least as early as 2000 B. C. The morality which it

commends is accepted by its author as already very ancient, or as Virey expresses it, "The teaching of ethics has been perfect from the earliest times." In this most ancient of books, all the leading vices are condemned and all the virtues commended. The same high tradition of conduct is sustained in the famous Egyptian parchment, *The Book of the Dead*, and later in *The Precepts of Ani*. Renouf, therefore, justly says, "The recognised Egyptian code of morality was a very noble and refined one."[1] He also approves the judgment of Chabas, who writes: "None of the Christian virtues is forgotten in it; piety, charity, gentleness, self-command in word and action, the protection of the weak, benevolence towards the humble, deference to superiors, respect for property in all its details, . . . all is expressed there."[2] From these early treatises, written long before the time of Moses, we may compile the following Egyptian decalogue: —

1. Thou shalt honour God above all.
2. Thou shalt give him his offerings in full measure.
3. Thou shalt not sin.
4. Thou shalt not bear false witness.
5. Thou shalt not murder.
6. Thou shalt not commit adultery.
7. Thou shalt not covet another's property.

[1] Renouf, *Religion of Egypt*, p. 74.

[2] Quoted by Renouf.

8. Thou shalt not injure another's rights.
9. Thou shalt do only good to the poor and helpless.
10. Thou shalt keep thy mind pure.

For the beginnings of morality, therefore, we are forced backward to a prehistoric epoch in which were developed those germs of the human conscience which, if not always fruitful, are nevertheless universally present in even the lowest existing races of mankind.

The Evolution of Conduct.

Prior to the conformity of conduct to any standard of rectitude, and, therefore, as a necessary basis of morality, must come the genesis of conduct itself. No one has so well defined and analysed the nature of conduct as Herbert Spencer. "It is not co-extensive with the aggregate of actions. . . . The conception excludes purposeless actions. . . . The definition of conduct which emerges is either acts adjusted to ends, or else the adjustment of acts to ends; according as we contemplate the formed body of acts, or think of the form alone." [1]

There can evidently be no such "adjustment" as conduct is defined to be, without structure and environment, — structure affording the means of adjustment, environment the ends in view of which

[1] Herbert Spencer, *The Data of Ethics*, p. 5.

the adjustment is made. Hence the essentially biological character of conduct. Given a living organism, it must adapt itself to the changing conditions of life. Its primary end is the continuance of its existence. Secondary to this may emerge the expansion and elevation of its life. When these ends are apprehended in consciousness, and intelligence becomes serviceable in the promotion of these ends, conduct has reached a level which is immediately preparatory to the moral; but morality does not supervene until the means of accomplishing the ends and the wider relations of purposive action can be compared with some standard of rectitude.

The first chapter in the history of organic adjustment is essentially biological only. It is wholly involved in the process of vital development, being at first unconscious, then conscious, and finally purposive. This progress, which is exemplified in the development of every child, was equally necessary in the moral evolution of the race. Without organic adjustment as the basis of purposive action, we cannot understand how conduct could ever have been possible. And it is necessary not only as preliminary to conscious self-direction, but as constantly supplementary to it. If the whole direction of our lives were suddenly delegated to our intelligence, we should probably soon perish, partly

because the machinery of life is too complicated for our supervision, but mainly for want of experience in the processes of vital adjustment. But the infant is already well advanced in the course of development when voluntary action first becomes possible, so that its safety and well-being, in so far as they are dependent upon itself, are secured not by its intelligence, but by the reflex actions which have already been established, placing it in a condition of adjustment of which it only gradually becomes conscious. A pre-moral state is, therefore, seen to be necessary for the race as it is for the individual, from which a heritage of organic adjustments is received as the indispensable basis of conduct.

It is evident, then, that the animal essentially underlies the ethical. There must be not only a sphere of conduct, which presupposes organic conditions, such as needs, impulses, and ends to be attained, but also the means of conduct, — an organism, pre-adjustments, and results of experience. Morality, therefore, cannot be, in the absolute sense, primordial. It implies necessary presuppositions, such as are supplied by the animal nature.

The Emergence of Morality.

It is important to note that there is in human life a general background of action which bears

none of the characteristics of moral conduct, and which is, nevertheless, recognised as a legitimate component of human activity. Mr. Spencer asks, "What distinction is habitually made between the conduct on which ethical judgments are passed and the remainder of conduct? As already said," he proceeds, "a large part of ordinary conduct is indifferent. Shall I walk to the waterfall to-day? or shall I ramble along the sea-shore? Here the ends are ethically indifferent. If I go to the waterfall, shall I go over the moor or take the path through the wood? Here the means are ethically indifferent. And from hour to hour most of the things we do are not to be judged as either good or bad in respect of either ends or means. No less clear is it that the transition from indifferent acts to acts which are good or bad is gradual. If a friend who is with me has explored the sea-shore but has not seen the waterfall, the choice of one or other end is no longer ethically indifferent. And if, the waterfall being fixed on as our goal, the way over the moor is too long for his strength, while the shorter way through the wood is not, the choice of means is no longer ethically indifferent. Again, if a probable result of making the one excursion rather than the other, is that I shall not be back in time to keep an appointment, or if taking the

longer route entails this risk while taking the shorter does not, the decision in favour of one or the other end or means acquires in another way an ethical character; and if the appointment is one of some importance, or one of great importance, or one of life-and-death importance, to self or others, the ethical character is pronounced. These instances will sufficiently suggest the truth that conduct with which morality is not concerned, passes into conduct which is moral or immoral, by small degrees and in countless ways."[1] It is also evident from these same instances that moral action is externally in no respect different from non-moral action. The difference arises wholly from the new relations in which these actions stand to ourselves or others.

We are deeply concerned, therefore, to know where the distinctively moral emerges, where morality begins. Starting from the lowest form of adaptations of means to ends, Mr. Spencer defines the "good" as that which is "well adapted to achieve prescribed ends." Conversely, the "bad" is that which is not adapted to achieve prescribed ends. "The good knife is one which will cut; the good gun is one which carries far and true; the good house is one which duly yields the shelter, comfort, and accommodation sought for." This is quite true, but if these

[1] Herbert Spencer, *The Data of Ethics*, p. 6.

definitions are accepted as universal, the "good" way is the easy way, or the pleasurable way; and even such "indifferent" matters as whether we shall walk to the waterfall to-day, or go over the moor, or through the wood, seem to be moral questions. This view renders every choice a moral one, if any "prescribed end" is involved. It very consistently leads to the conclusion at which Mr. Spencer arrives, that "the good is universally the pleasurable." Every action, therefore, involving pleasure, becomes a moral action.

This naïve hedonism affords a very simple solution of the nature of morality, provided it is admitted that it supplies any solution whatever. But, seriously considered, it plainly fails to indicate what is distinctively "moral" in conduct. It makes no provision for a discrimination of ends, but only of means. The "good" is that which is "well adapted to achieve prescribed ends." But are "ends" wholly indifferent as regards morality? Mr. Spencer answers "No," but "increased duration of life is the supreme end."[1] Rectitude must be measured by the adaptation of an action to achieve this "supreme end." Virtue is thus identified with longevity, duty with the instinct of self-preservation, and goodness with existence.

[1] Herbert Spencer, *The Data of Ethics*, p. 14.

If this is a valid identification, morality is as universal as the self-conserving impulse, and belongs to animals as well as to man. It is needless, therefore, to seek for its special genesis, for it is only a property of living tissue. It may be attributed even to plants, which are "good" or "bad," according to the success with which they adapt themselves to the "supreme end," and thus insure the prolongation of their existence. The law of natural selection becomes the ultimate ethical principle, for the survivors in the struggle for existence are the "fittest" in the only sense conceded to morals, since "increased duration of life" is the "supreme end."

While the idea of morality is thus rendered much more rudimentary and generic than it is generally considered to be, it is reduced to a plane which admits of no elevation. Goodness being essentially persistence, there can be no attainment of it by a mode of action which sacrifices "increased duration of life" to any supposed superior phases of life. The conception of "higher" and "lower," or of quality of life, is necessarily excluded. Emphasis is thrown entirely upon the protensive element of existence, its duration. But it may be said, "the good is universally the pleasurable." "Whatever increases pleasure, raises the quality of life." Pleasure as such, however, can be measured by quantity only, and if the

qualitative distinction is admitted, it is with reference to something other than pleasure itself. A scale of pleasures undoubtedly exists, but its grades are determined by considerations external to pleasure as such.

But virtue, duty, rectitude, and progress are ideas habitually associated with denial, effort, sacrifice, and aspiration, not with gratification and indulgence. Nor does morality consist, to most minds, in mere self-persistence, or in making provision for self-persistence, but rather in the elevation of life, in conforming it to higher and more rational standards. The distinction between "higher" and "lower" is fundamentally human. It is the consciousness of this distinction which separates the non-moral from the moral in the line of development. The animal has many of the dispositions and sentiments, including those called "altruistic," which are classed as morally good when they appear in man; but, being unconscious of himself as capable of "higher" and "lower" in conduct, the animal is non-moral. His powers of analysis and reflection are too feeble to enable him to grasp those relations, in which actions, in order to become moral, must stand. Man, on the contrary, having arrived at self-consciousness, that is, knowing himself as a source of conduct, and distinguishing between the "self," the "not-self," and the "other-self," is conscious of these relations. Feeling

the pressure of nascent possibilities within himself, and perceiving them in others, he apprehends the difference between "higher" and "lower," and the possibility of the higher creates in him the sense of what "ought" to be; of something "owed" by his expanding powers, making him capable of "duty." It is an unquestioned fact that man has grown in power and intelligence. He could not be unconscious of these emergent potencies, and the consciousness of them, revealing to him his relation to conduct, is "conscience" or moral consciousness.

It is singular that Mr. Spencer, whose thought is so permeated with the idea of evolution and progress, should have omitted to observe and to emphasise so obvious a fact in human experience as emergent faculty and its psychological consequences. It is manifested in every child as he reaches that period when the sense of "responsibility" dawns upon him, it being nothing else than the apprehension of new demands as correlated to augmented powers. It is a striking feature of adolescence, and may be encouraged or suppressed by the customary standards of a community. It argues nothing against its reality that it is produced as a result of experience and education. In savage and barbarous races it rises to no great height, but a little cultivation develops it in a wonderful manner. "The Fuegians taken to

England by Fitzroy, on returning to their own country after a three years' absence, called their countrymen 'monkeys, dirty, fools, not men.'" "Captain Weddell detected the Fuegians in a good many attempts at pilfering; though a very little correction seemed enough to put a stop to it." The Andaman women, following their accepted custom, among themselves appear without shame in perfect nudity; but in the presence of strangers exhibit an unusual and unexpected modesty. These are but a few of a multitude of examples[1] that might be cited to show the spontaneity of a discrimination between higher and lower ideals of conduct when once presented to the mind. But such distinctions are never spontaneous, and can hardly be induced by training, in animals lower than man. The difference is obviously owing to the presence of self-consciousness.

Morality is thus seen to have both a subjective and an objective basis. Subjectively, it arises when self-consciousness appears, that is, when the faculty is developed of regarding self as a factor in conduct capable of actions of a superior kind. Hence springs into existence the feeling of "obligation," a sense of owing what one is capable of rendering, or conduct upon one's own highest plane of action. Objectively,

[1] From Herbert Spencer's *Descriptive Sociology.*

it is based upon a perception of a scale of dignity in beings determined by their rank, and hence of a gradation of actions as essentially higher and lower, — an apprehension of proportion between faculty and performance. Whenever in the development of life these conditions were first fulfilled, morality as distinguished from non-moral conduct came into existence. Then, for the first time, the whole train of moral judgments and sentiments became at once possible. Responsibility, guilt, innocence, and remorse are the aspects of a common sensibility touched by a perception of new relations. Impossible to the brute, because he is incapable of conceiving of himself as determining his actions and of forming an equation between his real and his ideal performances; they are necessary to man, who experiences them all through his consciousness of himself as an agent with higher possibilities. The most intelligent animals do, indeed, manifest feelings akin to these, but probably never except in the presence of man, whose will becomes to them a standard of behaviour. To man alone is opened the vision of self-generated ideals. A consciousness of them, and of his personal relation to them, is the special distinction of man. It is this which renders him a moral being.

The Development of Moral Consciousness.

We must now consider the conditions under which this consciousness of an unfolding order of superior possibilities, and hence of "higher" and "lower" motives to action, was produced in primitive man.

The organic and intellectual prerequisites of self-consciousness we need not discuss, for it is only with the emergence of self-conscious activity that moral phenomena could really begin. Self-consciousness itself was the inevitable result of reflective thought in the formation of speech and its subsequent employment. This, and not language or any special art, is the veritable dividing line between the animal and the human. Its preconditions belong to the animal world; its achievement and its consequences separate the human from that inferior realm by a fixed line of demarcation. With self-consciousness the play-impulse rose to the level of art, morality became an attribute of conduct, and religion had its birth.

If moral consciousness is primarily self-consciousness, our first task is to show how this form of self-knowledge arose from the general consciousness common to all the higher animals. Not only in the animal, but also in young children, ideas as well as things are wanting in definite self-reference. Perhaps it would be more exact to say, that the activities

of self are not discriminated from activity in general. Language is acquired and quite extensively employed long before the idea of "self" as a subject or as an agent is apprehended. The young child refers to himself invariably in the third person, using his own proper name instead of a pronoun until about the third or fourth year. At that time, the style of expression changes, the first person is clearly discriminated, and thereafter "I," or its equivalent, becomes almost the dominant word in conversation. There are, it is true, premonitions of this conscious egoism not only in early infancy, but even in the actions of animals, as when a pet dog manifests jealousy of others, as he frequently does. The habitual use of the third person by a child persists after the apprehension of the self is clearly apparent, — an excellent example of the automatism of language and the force of habit. But it is unquestionable that the clear apprehension of the self, as a centre of interests and activities prominent in the field of reflection, is contemporary with the first use of the pronoun.

The development of the child is but an epitome of the evolution of the race, but with an important difference. The attainment of self-consciousness by the human infant is predetermined by heredity, the child being the descendant of a self-conscious ances-

try. The first attainment of self-consciousness in the race, on the other hand, was a new acquisition, a condition not derived, but individually acquired. The first appearance of self-consciousness, therefore, marked a new epoch in life-history, and was a transition to a superior order of being.

Language, as we have seen elsewhere, was evolved as an oral extension of gesticulation through the agency of concomitant clamour. Its beginnings are evident upon the merely animal plane, and long before the idea of "self" was formed, and as a necessary means of its formation, less abstract ideas must have been developed and named. Every primitive root of Aryan and Semitic speech, according to Max Müller, that is, "the elements of speech which defy further analysis, are, with a few insignificant exceptions, expressive of the acts of man."[1] The earliest concepts were, therefore, ideas of "agency," or "causality." When primitive man arrived at the idea of "self," this concept belonged to the category of "agents." The distinctions of "good" and "bad" had already arisen as applicable to the things with which he had to deal, according as they were or were not agreeable and useful to him. They were found ready-made as discriminations regarding the fitness of objects to achieve his ends in the spheres

[1] F. Max Müller, *Anthropological Religion*, p. 67.

of appetite and purpose. But, with the consciousness of "himself" as an agent, there appeared the relation between "himself" and his natural "ends," and hence a judgment upon himself as "good" or "bad," according as he did or did not fulfil them. This is moral consciousness in its lowest and also in its highest form.

The Discovery of Moral Order.

We may now trace more specifically the relations in which, in the course of man's activity as a self-conscious agent, moral judgments and moral sentiments would appear.

Society has its humble beginning in the lower forms of animal life, and the higher animals are themselves societies, in the biological sense, in which interdependent parts, division of labor, and mutual service are already evident. The lengthened period of maternal care in the rearing of a human being implies, as John Fiske has suggested, the long cultivation of altruistic sentiments in the ancestors of man. With the development of sympathy and affection a monogamistic constitution of the family probably arose even in the pre-human state. It certainly exists among many of the noblest mammals, a fact which can be explained only by the growth of a certain instinctive solidarity between the sexes. It is true,

that anthropologists have often enlarged upon the existence of a primitive sexual promiscuity, but without a due consideration of the evidence. Darwin and Maine have declared it to be improbable, since the passion of jealousy is so strong in the whole animal kingdom that it cannot be supposed to have been dormant in primitive communities of men. The more critical anthropologists now regard Bachofen's "Mutterrecht," which maintains that man passed from the state of promiscuous intercourse into a marriage state based on the dominating power of woman, as "the rhapsody of a well-informed poet rather than the work of a calm and clear-sighted man of science."[1] Starcke, who expresses this opinion, disputes the assertion "that the first human community lived in promiscuous intercourse, and that monogamous marriage was gradually developed from this condition by reflections on the sexual relation."[2] Westermarck holds that "the hypothesis of promiscuity has no foundation in fact," and that "it is opposed to all the correct ideas we are able to form with regard to the early condition of man."[3] He thinks the monogamous marriage of the primates "very probably due to the small number of young, the female bringing forth

[1] C. N. Starcke, *The Primitive Family*, pp. 242, 243.

[2] *Id.* p. 242.

[3] Edward Westermarck, *The History of Human Marriage*, p. 114.

but one at a time; and, among the highest apes, as in man, also to the long period of infancy."[1] Beaumarchais' saying, — "that which distinguishes man from the beast is drinking without being thirsty and making love at all seasons," — is probably more true of contemporary than of primeval men.

Humanity began its career not only in society, but so far as the evidence indicates, in family relations, and with an inherited outfit of altruistic sentiments. Self-consciousness awoke upon an actual moral order. The authority and care of parents, the stimulus and emulation of brothers and sisters, were a part of the first human environment. So delicate an organism as the human body, in any but the most tropical climate, demanded food, shelter, and clothing; and, hence, labor, almost unknown to animals in the natural state, became necessary to man. The fruit of labor is property. The varied capacities of men rendered their possessions unequal, causing a difference of status and the relation of master and servant, the exchange of commodities and the conventions of trade. The whole realm of human culture was opened by the transformation implied in the dawn of self-consciousness.

Two factors are operative in the disclosure and enforcement of a moral order, — the imagination as the

[1] Edward Westermarck, *The History of Human Marriage*, p. 21.

faculty of ideals, and social institutions as the embodiments and perpetuators of moral results. The sense of freedom in the exercise of faculty is the starting-point of the æsthetic arts. Imagination in this realm is essentially constructive, and its products excite and direct realising activities. In the sphere of art this is very evident, but it is equally important in the sphere of conduct. Ideals, artistic and moral, arise in the human mind through the activity of imagination, crude and imperfect in the lower orders of intelligence, but gradually acquiring a dignity commensurate with its growth. These are progressively embodied in custom and incorporated into institutions, which react upon succeeding generations as public opinion and social organisation. They fix and determine the standards of judgment for the ordinary mind. The desire to be well considered in the community stimulates the sluggish to actions above the level of their predispositions, and, at the same time, inspires leadership and progress in those who would continue the work of social advancement.

A powerful support to morality is found in religion, which imparts to its precepts a superhuman authority. There can be little doubt that the preconditions to morality and religion are essentially the same, and that they, therefore, arose together. The right of a deity to command is a corollary of

his existence. The conception of the deity manifestly affects the ideas of morality, and the conceptions of morality are equally influential in determining ideas of a deity. It is evident, however, that religion and morality are not identical, since they are thus reciprocal. The conservative character of religion sometimes seriously affects moral progress, because its errors are sustained by a peculiar sanctity. Creed and ritual are the least flexible and progressive elements of religion, and at the same time its most ostensive characteristics. They assume with time an intrinsically sacred character. They are on this account the most effectual obstacles to moral advance. The wide discrepancy between precept and practice gives rise to the theological conception of "sin," which, in low types of religion, is as often a violation of some trivial prescription as it is of an ethical principle. The presence of sin, contrasted with a state of innocence, occasions the idea of a "fall," or lapse from a sinless condition. This is not incompatible with man's derivation from an animal ancestry, which prior to the rise of self-consciousness may be regarded as having been in a state of moral "innocence," the sense and reality of sin being impossible to the animal.

The existence of sin, both as an inherent disposition and as a perverted form of action, may be

explained as a survival of animal propensity in human life. Apart from mere ceremonial and creedal defections, — "theological sins" as they have been called, — the states of mind and modes of action regarded as "sinful" by the enlightened conscience, are for the most part the fruits of the "flesh" produced under the "law of the members" warring against the "law of the spirit." In this light, "sin" is the persistence upon the human plane of tendencies which belong to the animal plane, and which should, therefore, be subjected to the law of reason. From the moral point of view, "to be carnally minded is death." [1] Such an explanation is not discordant with the statement, "when lust hath conceived, it bringeth forth sin; and sin, when it is finished, bringeth forth death." [2] And it seems but a paraphrase of this other statement: "Where no law is, there is no transgression; . . . but sin, taking occasion by the commandment, wrought in me all manner of concupiscence, for without the law sin was dead." [3] Sin is the disturbance of higher life by the intrusion of a lower.

[1] St. Paul, *Epistle to the Romans*, viii, 6.
[2] St. James, *General Epistle*, i, 15.
[3] St. Paul, *Epistle to the Romans*, iv, 15.

The Essential Nature of Morality.

In view of what is known of moral development, and of ethical capacity among the lowest races, it certainly cannot be maintained that a clear intuition of ultimate moral principles is universal among men, as insisted upon by the doctrinaires of the intuitional school of moralists. Much less can it be held that such an intuitive apprehension was possible to the earliest men. On this account the advocates of evolution have resorted to various hypotheses to account for moral phenomena as exhibited by the most highly developed races, where their existence is undeniable. The greater number of these hypotheses, beginning with the assumption of a primitive non-moral condition, have wholly failed in deriving what is recognised as distinctively moral, and hence in explaining the facts of the moral consciousness. The result is, that the philosophy of evolution is generally accused of denying the distinctively moral altogether. In so far as it attempts to generate the ethical out of the elements of mere utility, this accusation is just. The "moral" is as different from the "useful" as truth is from pleasure. They constitute different categories. But the genetic method applied to the actual data of ethics should recognise and explain this distinc-

tion. What, then, is the essential nature of morality?

The "good" man, or "moral" man, is not the one who most fully attains "increased duration of life," or the "maximum amount of pleasure." He is not even the one who contributes most to the "general aggregate of happiness." Moral excellence is not actually measured by objective worth to the community as desirable "social tissue," to use Leslie Stephen's expression. The "good" man is, indeed, the good son, the good husband, the good father, the good neighbour, the good citizen. He is the man who discharges the functions of a man completely, whose motives to conduct are the natural ends of his rational being as a man, whose performance is commensurate with his capacity. But the actual standard is a subjective one. His excellence is not measured by the consequences of his actions so much as by the elevation of his aims. The "good" man may be an invalid, a cripple, a blind or a deaf man, and hence a burden and a care; but, while these natural defects render him objectively less valuable, or even a minus quantity to be deducted from the efficiency of the community, they do not affect his moral excellence. He may still be a "moral" man and a "good" man.

All this will probably not be denied, but its significance may not be fully appreciated. It is the point

missed by most writers on the evolution of morals, and in missing it they lose the very thread of the discussion. The analysis of moral "goodness" just given, classes "morality" as a psychological experience. It does not exist except for a being capable of apprehending the relation between faculty and performance. For every such being it does and must exist. The moral category is simply the equation between faculty and action. To be a man and act like a brute, is not to render what is "owed," or what is "due." It is neglect of what "ought" to be done, a violation of "duty." In general, to act from any motive lower than the highest which an occasion presents, is to be morally delinquent.

The existence of morality, therefore, is not dependent upon the outward perfection of conduct. A low grade of intelligence will have vague and confused ideas of duty; and, as practice almost invariably falls below the accepted standard, the social condition may be very crude, and customary actions very barbarous, without the exclusion of moral experience. A real or even a supposed necessity may keep it upon a low level. Cannibalism, infanticide, polyandry, and other savage or degraded practices, are not inconsistent with moral judgment and sentiment upon other matters. These are perverted forms of conduct which are justified as being neces-

sary, or advantageous, or as having a religious sanction. Frequently they are not even justified, but merely accepted without reflection as established usages which pass unquestioned because they are customary. To more enlightened minds they seem shocking, horrible, worse than brutal. But it is interesting to compare our condemnation of these customs of the "nature-folk," as the Germans call them, with their revulsion in the presence of some of the "horrors" of civilisation.

The Progressive Ideal.

The practical defect of many theories of morals is, that they are too speculative and too ideal to fit the facts of human morality in its lowest types. We need, therefore, to take account of these rudimentary forms of moral phenomena, in order to arrive at a true view of the subject. It is customary for anthropologists to regard the lowest savages as representing the primeval condition of man, not only in morals but in all respects. So far as culture is concerned, this is doubtless just; but the assumption cannot be true with regard to psychological aptitudes. The contemporary savage is either a degraded descendant of beings superior to himself, the mere wreck and ruin of a man; or he is an example of arrested devel-

opment, a spent shot, as it were, having fallen short of his intellectual maturity. In either case it is not legitimate to treat him as if he were the equivalent of primeval man in psychic energy and vigour of faculty. He has missed the heritage of the centuries, either because he was incapable of receiving it and fell into degradation, or because his ancestors were incapable of achieving its results. He is the feeble brother of civilised man, and was "left" in the race because he could not progress and could barely persist. But civilised man, — the man of arts and sciences and literatures and philosophies and civil polities, — has wrought out, transmitted, and continued the work of humanity. To assign to him an ancestry like our contemporary savages, is to refer all progress to a source whose very distinction consists in the inertia and impotence that have rendered the savage stationary. By every available test, we are compelled to regard the modern savage as inferior in faculty to the progenitor of civilised man.

There can be no doubt that, in the lowest types of existing men, we have beings but little elevated above the anthropoid condition; and that, if we were to discover anything a little lower in the scale, we should be obliged to class it as "simian," or at least as "sub-human." We may, therefore, feel assured

that we are finding morality in its lowest terms, when we observe it in these lowest races.

And now, what do we find? "When the phenomena presented by the native inhabitants of the several great divisions of the earth's surface are compared," says Staniland Wake, "it is seen that the aborigines of Australia are on the whole the most barbarous."[1] Yet Sir Thomas Mitchell says of them: "They have been described as the lowest in the scale of humanity, but I found those who accompanied me superior in penetration and judgment to the white men composing my party."[2] Their intellectual activity is, however, "confined within a very limited range." We certainly do not find among them any "intuition of first principles." Their life is extremely degraded and repulsive in all its features. Still, they have an idea of "rights" as belonging to themselves and to others. "Few, if any, of now existing peoples," says Wake, "are wanting in this primitive phase of the moral sense." Collins, who travelled among them, says: "On our speaking of cannibalism, they expressed great horror at the mention, and said it was *wee-re* (bad). On seeing any of our people punished or reproved for ill-treat-

[1] Staniland Wake, *The Evolution of Morality*, vol. i, p. 66.

[2] Sir Thomas Mitchell, *Journal of an Expedition into the Interior of Australia*, p. 412.

ing them, they expressed their approbation, and said it was *bood-yerre* (good), it was right. Midnight murders, though frequently practised among them, whenever passion or revenge was uppermost, they reprobated, but applauded acts of kindness and generosity, for of both these they were capable." [1]

At this lowest level of humanity we find judgments and sentiments of praise and blame respecting conduct and the motives which actuate it. This implies a standard, however low or erroneous it may be, of what is justly expected of a man. It displays a perception of that which is *below* and that which is *equal to* the standard. Here, then, is that distinction of "higher" and "lower," in motive and action, upon which moral judgment is based. Universally, among men of all grades, as Dr. Martineau has said, of two impulses present to the mind, "one is recognised as higher, worthier than the other." "This apprehension is immediately inherent in the very experience of the principles themselves, — a revelation inseparable from their appearance side by side." The moral judgment is not a reference to "pleasure-giving quality" as such, nor to "increased duration of life," but to the relative superiority of one impulse or action over another as related to what is "due" from the agent. Its characteristic is an affirmation of what

[1] Cited by Wake, *The Evolution of Morality*, p. 319.

"ought" to be done. Intuitions of first principles of morals, — that is, of universal truths, — are as much above the ordinary consciousness of a savage as the axioms of geometry or the law of gravitation. Education may enable him to grasp them, but they certainly do not lie open to his actual thought. But a moral judgment, to a being having an idea of himself, of his own rights, and by analogy of the rights of others, — is no more difficult than the perception that one is less than two. Owing two coins and paying one, leaves even the rudest savage a conscious debtor.

Perhaps the most rudimentary form of moral judgment is that which arises in connection with the first idea of "property," of a visible and tangible "thing" regarded as belonging to a "self." This idea would first arise in relation to one's own possessions, especially when considered as the result of one's labour. Here is the apprehension of a "right." The rights of others would next be recognised by analogy. Gradually rights of a higher order would come into recognition, — the right to life, to liberty, to truth, to sympathy, to affection.

The evolution of morality is, then, the gradual formation of a moral consciousness through the perception of what is "due" in the relations of social life. Thus arises the idea of "duty." The develop-

ment of faculty ever demands activity upon a higher plane. This imperative of reason has the authority of objective truth, not merely of optional personal feeling; for it is a part of the natural order, a correlation of duty to an ascending gradation of faculty. It is as independent of the individual will as the truths of mathematics. A widening horizon of urgent action accompanies the enlargement of experience and the growth of intelligence. The moral standard is, therefore, a progressive ideal, ever unfolding its contents to the vision of developing personality. It is supported by the "sense of wrong" when injury is personally suffered or neglect endured. This feeling is revived as "sympathy" with the wrongs sustained by others of a kindred nature, as "admonition" when wrong against them is contemplated by us, and as "remorse" when wrong is actually inflicted. Thus, the whole nature of man pays tribute to the authority of "conscience," which becomes the living code of the laws of conduct as disclosed to human intelligence and registered in human sensibility.

IX.

THE GENESIS OF RELIGION.

A VAST array of definitions of religion has been collected by Max Müller,[1] to which he adds his own, most of them so evidently coloured by a previous theory of its nature and origin as to be practically useless. Broadly considered, and with the sole purpose of designating a group of phenomena by what is most common and essential to it, we may define "religion" as "belief in a superhuman being or beings regarded as objects of worship." Thus defined, religion is practically universal among men. A profound student of the subject, Professor Tiele, of Leiden, says: "The statement that there are nations or tribes which possess no religion, rests either on inaccurate observation, or on a confusion of ideas. No tribe or nation has yet been met with destitute of belief in any higher beings; and travellers who have asserted their existence have afterwards been

[1] F. Max Müller, *Natural Religion*, pp. 27, 140.

refuted by the facts. It is legitimate, therefore, to call religion, in its most general sense, a universal phenomenon of humanity."[1] The late Professor Quatrefages,[2] of Paris, one of the best informed of modern anthropologists, speaking solely as a naturalist, affirms the same fact, and it is now a matter of general agreement.

Many of the great religions of the world, such as Judaism, Buddhism, Christianity, and Mohammedanism, have been transmitted and propagated by means of literary documents which contain in part the history of their origin; and to these sacred books have been ascribed approximate dates of authorship. These religions may be spoken of, therefore, as historic, their origin and development falling within the historic period, or at least being to some extent referred to in the documents themselves. These are of course, relatively late products in the life of humanity, and are not to be considered in discussing the question of the origin of religion itself. It is a matter of universal consensus, that it had a prehistoric origin, and that this must be sought, if sought at all, in the earliest period of human life upon the globe.

The universality of religion as a human phenome-

[1] C. P. Tiele, *Outlines of the History of Religion*, p. 6.

[2] A. De Quatrefages, *The Human Species*, pp. 482, 483.

non involves its natural necessity. It is not a fortuitous incident in the life of a single tribe, or a few tribes, and cannot be attributed to the inventive ingenuity of priests. Such crude and gratuitous hypotheses have long been abandoned by intelligent men. Like that of language, which it resembles in universality, the origin of religion must be sought in some deep-rooted faculty of man, through whose constant operation it has been perpetuated. The purely artificial and arbitrary cannot be universally imposed upon a race of intelligent beings. Native aptitude and inevitable causation alone can account for a universal human activity. As much as seeing and hearing, religion is to be explained only as the result of resident forces reacting upon external conditions. The diversity of forms in which religion has existed adds to the complexity of the problem, but it in no way exempts a serious intelligence from seeking a solution.

The Hypothesis of Supernatural Revelation.

It is a popular idea that religion had no other origin than a divine annunciation to primitive man, a special communication made soon after his creation, by which the object of worship was revealed to him and the impulse of reverence thereby first

implanted in his heart. Such a conception may not prove unsatisfactory until an effort is made to give it definite form in the mind, but it then displays its total insufficiency and its purely verbal meaning.

This baseless assumption of a primitive revelation has been definitely and strongly repudiated, even by theologians, and in the name of man's religious nature. "Although often advanced in the supposed interests of religion," says Professor Fairbairn, "the principle it assumes is most irreligious. If man is dependent on an outer revelation for his idea of God, then he must have what Schelling happily termed 'an original atheism of consciousness.' Religion cannot, in that case, be rooted in the nature of man — it must be implanted from without. The theory that would derive man's religion from a revelation is as bad as the theory that would derive it from distempered dreams. Revelation may satisfy or rectify, but cannot create, a religious capacity or instinct, and we have the highest authority for thinking that man was created 'to seek the Lord, if haply he might feel after him and find him,' — the finding being by no means dependent on a written or traditional word. If there was a primitive revelation, it must have been — unless the word is used in an unusual and misleading sense —

either written or oral. If written, it could hardly be primitive, for writing is an art, a not very early acquired art, and one which does not allow documents of exceptional value to be lost. If it was oral, then either the language for it was created, or it was no more primitive than the written. Then an oral revelation becomes a tradition, and a tradition requires either a special caste for its transmission, becomes therefore its property, or must be subjected to multitudinous changes and additions from the popular imagination — becomes, therefore, a wild commingling of broken and bewildering lights. But neither as documentary nor traditional can any traces of a primitive revelation be discovered, and to assume it is only to burden the question with a thesis which renders a critical or philosophical discussion alike impossible." [1]

The religious nature has been ascribed even to animals, and certainly some of the emotions akin to those of religion may be found in the affection, fear, and devotion of the dog to his master. But it can hardly be seriously maintained that animals have a religion in the human sense. And yet it is evident that the elements of feeling which might be developed into reverence and worship are not wholly

[1] A. M. Fairbairn, *Studies in the Philosophy of Religion and History*, pp. 21, 22.

wanting in the dumb creation. So deeply rooted in sensitive and perceptive life are those impulses which are exhibited in the act of worship, that, if self-consciousness, reflection, and imagination were added to the animal faculties, even animals might become susceptible of a truly religious experience. It is, of course, true that under this supposition they would be animals no longer. But it would be far easier to discern the germs of faith and adoration in the noblest of the animals than to deny them to the most primitive representatives of man. That these are really inherent in his nature, not superimposed upon an essentially atheistic basis, seems to be the more credible as we enter sympathetically into the emotional life of all sentient creatures.

The Theory of Primitive Fetishism.

Among the lowest races of men a superstitious regard for "fetishes," or, as Andrew Lang has called them, "the odds and ends of things," to which indwelling spirits are ascribed, is very general. This led De Brosses, and afterwards Auguste Comte, to affirm that all religion had its origin in fetishism. The idea constituted an essential part of Comte's positive philosophy, which traced the development of the human mind through three stages, the theo-

logical, the metaphysical, and the positive. This theory of the development of religion is now generally abandoned as deficient in a basis of facts. "Made on the strength of evidence furnished by early travellers, whose contact was chiefly with races partially advanced and even semi-civilised," says Herbert Spencer, "the assertion that fetishism is primordial gained possession of men's minds; and prepossession being nine points of belief, it has held its ground with scarcely a question. I had myself accepted it, though, as I remember, with some vague dissatisfaction, probably arising from inability to see how so strange an interpretation arose. This vague dissatisfaction passed into scepticism, on becoming better acquainted with the ideas of savages. Tabulated evidence, presented by the lowest races, changed scepticism into disbelief. . . . As the facts happen to be exactly the opposite, the statement is conclusively disproved."[1]

The Theory of Ancestor-Worship.

Mr. Spencer's own theory, shared in substance by Tylor and others, traces the beginning of religion to the worship of ancestors. This ingenious hypothesis may be briefly outlined as follows: The mental

[1] Herbert Spencer, *Principles of Sociology*, vol. i, p. 343.

type of primitive man is to be found in the savage of to-day. To him all dreams are realities, and dreamland is, therefore, the spirit-land; for in dreams ideas differ from perceptions only in being more dim and less coherent. The memories of dreams are accepted by him, and told in good faith as actual experiences of the spirit-land, and thus that shadowy realm becomes an object of unquestioning belief. In dreams, his buried ancestor appears to him, a ghostly but actual presence, who can revisit and affect this visible world. The grave is made an object of veneration and of frequent visitation. There the family goes to receive the commands of the departed, for he is more likely to appear in this vicinity. To mark the grave for ready resort and in honour of the dead, it is first surrounded with rude stones. As skill and wealth increase, it is more elaborately marked, and finally walled in and covered. The grave has become a shrine; the shrine, a temple. The dead chief may want his dog and horse in the spirit-land. An altar is erected, the animal is slain, and sacrifice is instituted. Perhaps he will wish the company of his wife, and human sacrifice is added. He is pleased with these offerings, and will answer requests. These are made with the sacrifice, and prayer has become a ceremony of religion. In the migrations of a people, the grave is lost, but what

matters this? the spirit can accompany his people. He leads them in their wanderings, and affords them protection. Religion is now established in the minds and hearts of men. A skilful priesthood perpetuates it to their personal profit. The doubter is ostracised or made the victim of the next sacrifice. Thus has arisen the institution which Wordsworth calls

> "Sacred Religion, mother of form and fear,
> Dread arbitress of mutable respect;
> New rites ordaining when the old are wrecked,
> Or cease to please the fickle worshipper."

It is an unquestioned fact that ancestor-worship is widespread, although by no means universal, among the lowest races. But, unfortunately for the supposition that it was the primordial form of religion, it is difficult to harmonise the known facts regarding it with the principle of continuous development. The country where ancestor-worship is most prevalent is China, and the ancient literary documents of the Chinese people admit of an inquiry into its history among them. It is claimed by scholars who have patiently investigated the subject that "no ancestor in China has ever become a god." Dr. Victor von Strauss, an eminent authority in the history of religion, says: "It can be proved that in China ancestor-worship has enjoyed the highest respect for four thousand years, probably

even for longer. It is practised most conscientiously by the emperor and by the common people. But it has been, and has always remained, a concern of the house or clan only, and even for them the spirit of an ancestor has never become a god." [1] The same scholar asserts that in Egypt, where divine honours were paid to kings during their lifetime, "even the best and mightiest among them have never become popular deities." The same may be said of the Roman emperors apotheosised after death. In the earliest theogonies, like that of Hesiod, the gods are only exalted men, generated like mortals, but behind them are the great nature-powers who produced them. They sprang from the union of "Earth" with "starry Heaven." Pindar attributes a common nature to the anthropomorphic gods and men. Sophocles calls the earth the "all-nourishing, the mother of Zeus himself." All the Greek tragedians, Æschylus in particular, place a dread "fate" back of all gods and men alike. A similar universal power stands behind the German gods. There seems to survive in these ancestor-worshippers an idea of some antecedent power, supreme over all deified individuals. It is the vague tradition of some earlier object of worship, something more

[1] Victor von Strauss, *Entstehung und Geschichte des altägyptischen Gotterglaubens*, p. 9.

divine than apotheosised ancestors. The worship of the dead, wherever we can trace it, turns out to be not essentially unlike the Christian worship of canonised saints and martyrs, which seems to be the modern continuation of an ancient pagan custom.

As Mr. Spencer's early faith in fetishism, as the primary form of religion, was shaken by an appeal to "tabulated evidence," so might a predisposition to find the origin of religion in ancestor-worship be disturbed by the facts furnished in the volume on the *Lowest Races* in his admirable *Descriptive Sociology*. Of the seventeen "lowest races" there enumerated, five, the Fuegians, Andamans, New Guineans, Samoans, and Javans, appear not to worship their ancestors at all, although not wanting in superstitions. The Fuegians sometimes kill the aged women for food, in times of scarcity, but refrain from mentioning the dead. The Andamans have no notion of a future state. Of the twelve races to whom veneration for ancestors in some form is ascribed, the Australians have a horror of their dead enemies, but not of their dead ancestors. These migrate to a better country, and become "white fellows." They do not propitiate the dead with sacrifices. The Veddahs present food to the shades of their ancestors, but do not fear them. They are

guardian spirits merely, and the spirit-world is benevolent. The Tasmanians held that their dead relatives were tutelary agents. They are also superstitious about the heavenly bodies. The New Caledonians regard the gods as their ancestors, which easily accounts for their belief that their relatives when dead become gods. The Fijians enroll their chiefs among the gods during life. The Sandwich Islanders regard themselves as descended from the gods. The Tahitians say that the gods eat some spirits and deify others. The Tongans have no idea of the origin of the gods, but regard the souls of nobles and chiefs as divine, although belonging to a special class of deities. The New Zealanders attribute to their chiefs a divine descent, but also personify natural phenomena. If the "lowest races" are to supply the facts for an induction regarding primeval religion, the evidence for ancestor-worship as primordial is certainly not as strong as one might expect it to be. If, as Mr. Spencer himself suggests, these races are not necessarily types of primitive man, but degenerate descendants of men who were ancestor-worshipers, pure and simple, we have *no facts whatever* in support of this hypothesis, and must rely wholly upon *a priori* reasoning. But, whether they are primary or not, these are at least the known facts regarding the religion of the

"lowest races" of men, and we see in them the evidence of a traditional sense of divinity, which is more or less variously applied by some of them to their ancestors.

But, apart from the inductive results which it fails to harmonise, the theory that ancestor-worship was the primordial form of religion has this serious defect: it does not clearly indicate the origin of the idea of the "superhuman," not to say of the "divine." It represents the first men as classing their dead under a category whose genesis is not explained. That is precisely the problem. How did the first idea of a divinity originate? Sir John Lubbock declares that the adoration of a king is found only where he is powerful enough to withdraw himself from the common life of his fellows.[1] If no man can be a hero to his valet, no man can be a god to his equals. The traveller, Battel, says of a king of Loango, who was worshipped as the equal of a god, that he never allowed any one to see him eat or drink.[2] But the phenomena of religion are more primitive than the social differentiations implied in such personal distinctions. They exist among peoples who have no such exclusive aristoc-

[1] Quoted by Count Goblet D'Alviella, *Hibbert Lectures*, 1891, p. 67.

[2] *Id.* p. 67.

racy. When the category of the "divine" has been produced in the mind, it is easy to refer definite objects to it, even those which would not have occasioned it, and thus to create a pantheon. But to assume that the reverence for ancestors produced so universal a phenomenon as religion, is at the same time to disregard the facts of observation, which show that it does not produce it, and to obscure the natural causes of this deification. Among the Polynesians, the worship of the dead can be proved to have overlaid the ancient mythological nature-worship, and in China it was grafted upon the primitive nature-worship without ever resulting in the creation of gods.[1] No doubt men early dreamed of their departed ancestors, saw their ghostly forms in sleep, believed that these were the "doubles" of their relatives, and buried some of their possessions with them for use in the spirit-land. On the Congo, the son often kills his mother to secure the assistance of her formidable spirit. Trepanning may have been often performed with the purpose of providing a means of escape for the spirit from the body, as De Nadaillac suggests. The prehistoric dead were usually buried in the posture of the intra-uterine child, probably with the idea of birth into another

[1] A. Réville, in the *Revue de l'Histoire des Religions*, 1882, vol. v, p. 16.

life. Objects which could not have been anything else than fetishes were often interred with the body. But all these facts find their most natural explanation as consequences of a prior faith in divinities, rather than as signs of a process of deification. We have before us a problem, rather than a solution, when we ask why early men placed their ancestors in the sky, connected them with the stars, ascribed to them divine honours, and considered them as gods. It is a problem, however, upon which another series of facts may cast some light.

The Results of Comparative Mythology.

A profound and patient scholarship has been devoted to the study of ancient myths in connection with the remains of language, and has applied to these curious phenomena the method of comparison and the key of natural evolution. This deeper inquiry has shown that even these products of imagination are merely natural phenomena, to be accounted for by human agencies operating under psychological laws.

What are the results of this comparative science? They may be summarised in three propositions: — (1) the farther we penetrate into the past, reversing the order of development, the fewer in number are

the gods; (2) the oldest theogonies represent the gods as derived from the powers of nature; and (3), the primary object of worship indicated by this method of inquiry is the sky-god, or the shining sky itself.

"In the Homeric and Hesiodic poems, fragments can be found which seem like the survivors of an earlier faith, and look, even in the old epics, like the curiously carved stones of an ancient Gothic cathedral built into the walls of a modern church; or, to use Welcker's figure, like the fauna and flora of a lost world preserved in the successive strata of the earth's crust." The multiplicity and diversity of the gods dissolve away as thought moves backward in time. At last Zeus, the father and ruler of the Greek pantheon, is found to be no other than the bright, visible heaven. Indian mythology gives the same result. A comparison of all the Indo-European branches shows that the Sanscrit *Dyaus*, the Greek *Zeus*, the Latin *Jupiter*, the Gothic *Tius*, the Anglo-Saxon *Tiw*, the Scandinavian *Tyr*, and the old German *Ziu*, are merely variations of the original Aryan name for the "sky," and these are the names of the primitive "all-father," the king of gods and men. The early Aryans, before the dispersion of the Indo-European races, worshipped without a temple, and with no priest but the father of the

family, *Dyaus*, or *Dyaushpitar*, the supreme father of all, "immanent in the glory of the blue and brooding heaven."

"The whole mythology of Egypt," says Renouf, "may be said to turn upon the histories of Ra and Osiris. . . . Texts are discovered which identify Osiris and Ra. . . . Other texts are known wherein Ra, Osiris, Amon, and all other gods disappear, except as simple *names*, and the unity of God is asserted in the noblest language of monotheistic religion."[1] This elevated conception, which antedated the mythology of Egypt, existed two thousand years before the Christian era. "Horus and Ra and Osiris and Set," continues Renouf, "are names of individual finite powers, but a power without a name or any mythological characteristic, is constantly referred to in the singular number, and can only be regarded as the object of that 'sensus numinis,' or immediate perception of the infinite," which, like Max Müller, the writer considers "an intuition as irresistible as the impressions of our senses."[2] The "father of the gods" is Nu, the "sky." Yet, proceeds Renouf, "the magnificent predicates of the one and only God never in fact led to actual monotheism. . . . All individual things are nothing

[1] Renouf, *The Religion of Ancient Egypt*, p. 92.
[2] *Id.* p. 103.

but modifications, affections, of the One and All."[1] Who, then, were the principal gods? All Egyptian religion primarily radiated from the luminous sky. Osiris is the declining sun, veiling his glory in the many colours of sunset. Horus is the rising orb, avenging the death of his father, Osiris, piercing with his spear-like rays the dark monster who had swallowed him up. Ra is the midday sun, ruling the heavens in unclouded glory. Amon, the "concealed one," is the sun after he has sunken to the underworld, the "dweller in eternity."

The gods of the Chaldeans were arranged in triads, and were also representations of the sun in the various stages of his journey in the heavens. Anu was the hidden sun; Baal, the sun at noonday; Hoa, the flashing sun, whose rays signified an intelligent penetration.

But all these ideas, it will be said, belong to a very late period, — even though so remote from our own, — a period of moral development and relatively advanced culture, and they cannot possibly serve to reinstate the real beginning of religion. This is true, but they are earlier in time than any known facts of ancestor-worship, and so widespread as to indicate a remote and common derivation, for they belong to different races and distant countries. They

[1] *Id.* p. 240.

display the presence of powers that could and did evoke the emotions and ceremonies of a long persistent worship. They are more primitive than any known ancestor-worship among these peoples. They point to an original idea of a divinity above humanity.

The Psychic Origin of Worship.

Religion, in any human sense, could not have preceded self-consciousness, and this is realised only through the development of speech. Language was evolved as an oral extension of gesture, through the agency of concomitant clamour. The earliest concepts were ideas of "agency," or "causality," connected with human actions. When, therefore, the idea of "self" first emerged, or that of the personal agent, this concept belonged to the category of causation. The first idea of the nature of a cause, apart from the mere sequence of movements, was conceived in the terms of conscious action, or "will." Nature seemed filled with active beings related to, and hence similar to, the agent himself. In this there is no difficult process of reasoning, as the analytic statement of it may seem to imply, but merely a tendency to extend known forms of experience to the unknown. Hence arose

the "animism" which anthropologists find still to prevail among the most primitive peoples, and which they also ascribe to the earliest men. When the North American Indian cannot understand a thing, he says it is a "spirit." Even better instructed men are ready to make the same assertion. When an Australian was asked if he really believed that his *yambo* (spirit) could go out of his body, he replied: "It must be so, for when I sleep I go to distant places, I see distant people; I even see and speak with those who are dead." Understanding little, primitive man must have explained much by this simple process. If not everything, at least many things were thought to have a "soul." This naïve conception survives in poetry, as when in the Finnish Kalevala the prelude runs: "The cold has spoken to me, and the rain has told me her runes; the winds of heaven, the waves of the sea, have spoken and sung to me; the wild birds have taught me, the music of many waters has been my master."

But it is a great error to suppose that even the simple mind of primeval man actually attributed life and consciousness to *every* natural object, animate and inanimate alike. Even the animals distinguish between a living and a non-living object, as is shown by their ordinary conduct and required by the necessities of their existence, for they connot subsist

upon the non-living. It was only that beyond reach and examination, that which moved and was unusual, and called forth their wonder, to which they ascribed an indwelling spirit. The Todas of India call their deities *der*, and Colonel Marshall tells us that "there is a tendency among them for everything mysterious or unseen to ripen into *der*." Universally, the distinction between "nature" and the "supernatural" appears to be a contrast between the ordinary and accustomed course of things and some extraordinary and unaccustomed phenomenon. Perhaps the antagonism between "science" and "religion," in the popular mind, may be owing to this antithesis.

Animism and ancestor-worship are equally inadequate as an explanation of the origin of religion, for the reason that they are both wanting in precisely that quality which can evoke worship, namely, the attributes of the superhuman. It is only when to the idea of a "spirit" there is added that of the "superhuman" that we can arrive at anything corresponding to a true definition of religion. As Count D'Alviella has said: "The idea that certain beings, whatever their nature, may be of service to us, and that we can secure their help by the same means as are current in human society, even when we add the feelings of hope, fear, gratitude, and

anger, provoked by such relations, is no more than what springs out of the mutual relations of men themselves, without its constituting a religion."[1] The essential stimulus to religion is to be sought in some object able to inspire characteristic religious sentiments, which neither ordinary things, such as fetishes, nor human beings, whether living or dead, possessed the power to do.

The true root of religion is in man, not in the object-world or its impressions upon him. Schleiermacher, analysing the religious principle from a subjective point of view, striving to apprehend it in its essence rather than in its forms, found it in the "feeling of dependence." It is this sentiment which led primitive man to seek after a being in whose power and constancy he could trust. He instinctively felt out after an agent stronger and more enduring than himself. He could not find this in terrestrial objects or in his fellow-creatures. What he required was another "self," but more powerful and exalted. Such an agent might well have been symbolised in the wide-arching heavens above him, the central source of the mightiest energies that affected his existence, and yet the dwelling-place of eternal repose. The mind, therefore, projected its reflections upon this fathomless background of power until

[1] Count D'Alviella, *Hibbert Lectures*, 1891, p. 63.

whatever was most elevated in his experience was referred to the being in the sky.

The object-world presents to the senses of man its broadest expanse, its profoundest depth, its most perfect unity, its widest variety of change, and, at the same time, its most absolute immutability, in the all-encompassing, luminous, earth-arching heaven, whose dome of cloudless blue and storm-swept horizon, alternately flooded with noonday brightness and mantled in the deep darkness of night, now shining with the blaze of countless stars, and now dimmed with the fantastic forms of the gathering tempest, are the omnipresent spectacle from which man never escapes, — the most impressive natural exhibition of superior being and superhuman power. As self-consciousness emerged from the impersonal sentience of the animal world, and the individuality of self was set over against the general background of the not-self, what aspect of the object-world could better satisfy the conditions of an absolute antithesis? We cannot regard the first form of self-consciousness as highly abstract, but the least abstract possible. The body was a part of self in this earliest stage of discrimination. Surrounding objects, as they became defined and familiar in outline and qualities, were, therefore, simply other physical selves, of only equal or inferior interest. But the inaccessible, the

vast and immeasurable, the one object which could not be approached and examined, which was over all and beyond all, yet instinct with the mysterious attributes of light and motion, the visible heaven, alone possessed a wholly unique character. That stood out as essentially different from the things and animals and men with which the primitive man was surrounded and could compare himself. To it his eye had been ever more and more attracted as he became the creature with the upturned face, and the ubiquitous wonder of the shining sky constantly quickened his intellect and inspired his heart. The more its fascination wrought upon him, the more his wonder grew, until he voiced forth the depths of his emotions in ascriptions of praise and impassioned petitions. Not in fear, therefore, not in ghostly dreams of the dead, were the earliest germs of worship developed, but in the soil of spontaneous adoration and reverence, in the emotions of a creature contemplating the superhuman as it appealed to his wondering senses.

As man came to a fuller consciousness of himself, he inevitably translated the object of his sentiments of dependence and wonder more and more into the terms of his own nature. The discovery of the "double" in himself led him to ascribe a "double" to the sky. As his moral powers developed, these

also were extended to the being in the heavens, for the power best known to him was that of his own mind. Before this superior conception the merely physical features of the heavens ever receded more and more, as being less and less adequate to meet the newly disclosed demands of his intelligence.

The Nature of Primeval Religion.

We have, in the experiences described, a veritable religion, an estate to which mere animism and the worship of the dead do not attain. We cannot fairly describe it as "monotheism," or even as what Max Müller calls "henotheism," and hardly as "monolatry" — a form of idolatry with only a single object. It might, indeed, easily be raised even to the height of a genuine monotheism; but probably was not, through deficiency in reflective power and the operation of contrary tendencies. Even the Egyptian religion, in a period of high culture, as Renouf says, "never in fact led to actual monotheism." The Hebrew religion, even much later than the time of Moses, as it existed in the popular mind, was, according to the prophetic writings, far removed from a real monotheism, and consisted in the wavering acceptance of the pre-eminence of a tribal god, with a strong inclination toward a

general polytheism. It is impossible, therefore, to suppose that anything approaching the philosophical monotheism of modern theology could have been elaborated or even entertained by primitive man.

Reflective consciousness no doubt derived its first idea of order from the regular sequences of celestial phenomena. The succession of day and night, the recurrent motions of the moon and stars, gave man his first intimation of "law," apprehended under the category of "will." In all mythologies the sun and moon have played the rôle of "rulers." As the moral sentiments arose, they were naturally blended with the emotions of worship connected with the bright powers on high. How often must the troubled spirit of man have turned its vision toward the pure depths of the stainless blue and dwelt in meditation upon the realm of calm and light. For why should we consider primeval man a hopelessly dismal beast, whose powers were ever bent on plunder and bloodshed? The ferocity of far lower creatures is not unmitigated, and their untamed instincts are not the only elements of their nature. It is a gratuitous and shameful caricature of humanity, in which only a degraded mind can delight, to picture the earliest men as insensate brutes, incapable of human emotions and aspirations. It is universally held by evolutionists that man did

not spring from any existing type of anthropoids, such as the ponderous and brutal gorilla, the beastly orang, the stunted chimpanzee, or the agile but feeble-minded gibbon. If these are related to him, it is only as idiots and microcephali are, — as offshoots of a common stock, — but this at a level much lower than the human. The very apes, however, howl their welcome and joy to the rising sun in a concerted manner approaching a crude matin worship. At a signal from the leader the whole band breaks forth in a chorus, and at another signal general silence reigns throughout the forest. Another much humbler member of the great backboned family, and therefore a relative of man in the same sense as the anthropoids are, the dog, descendant of the unamiable wolf, speechless and devoid of reflective powers, leaps with joy and affection at the sight of his master, and responds with sensitive appreciation to the word and will of the one he loves. The lowest existing savage, whose long ancestral continuance in savagery proves him to be one of the very dregs of men, is not wholly irresponsive to the beauty and glory of the world. We cannot, therefore, deny to self-conscious man — the heir of altruistic sentiments derived from family life and of speech sufficiently advanced to be the vehicle of purposive discrimination — the possibility of all

that is involved in the postulates of an exalted nature-worship.

The Theogonic Process.

If it were possible to regard a monotheistic conception of the primitive object of worship as probable, the mobility of the physical object which must have represented it, the visible heaven, was too great to sustain that idea. The phenomena of the sky are exceedingly numerous and complicated. All the incessant changes would tend to be anthropomorphically conceived, and hence divisively named and regarded. The imagination, rather than the reflective faculty, was necessarily in the ascendant, and hence from both objective and subjective causes there arose a theogonic process, a multiplication of anthropomorphic beings in whom the divine assumed the attributes of the human. In this way, most literally, the gods were the progeny of heaven and earth. The heavenly pantheon of all ancient religions, and the wide prevalence of solar myths in every quarter of the globe, are the proofs that the assertion of a primitive human interest in the sky and its phenomena is not mere exaggeration.

The sun, the winds, the clouds, the streams which are their children, day, night, and finally even time

itself, are so locally or genetically connected that, to the untutored mind, they all seem to share in the powers of divinity, to be personal forces, modes of the divine, and even individual and sometimes conflicting gods. The gender of all primitive names, retained in most of our civilised languages, gave them the semblance of persons and opened the way for myth-making activity.

When the mind attained a higher level of abstracting power, its own subjective conceptions were freely personified, and wisdom (as Athene or Minerva), love (as Aphrodite or Venus), eloquence (as Hermes or Mercury), even the separate virtues, were apotheosised. The Romans were exceedingly prolific in the multiplication of such divinities. "They had solemn abstractions mysteriously governing every human action. The little child was attended by over forty gods. Vaticanus taught him to cry; Fabulinus, to speak; Edusa, to eat; Potina, to drink; Abeona conducted him out of the house; Domiduca led him home, and Adonea led him in. So, also, there were deities controlling health, society, anger, and all the passions and virtues of men."

This tendency to multiply divinities could have no limit, unless it be the exhaustion of imagined possibilities. Hence the apparently irrational results of this theogonic process. As Count D'Alviella has

well pointed out: "The same associations, real or imaginary, which have thus indefinitely multiplied the number of the gods, have also served considerably to extend the sphere of action originally attributed to each of them. Men probably began by demanding of each being or each object which they had deified only those services which it was really suited to render in virtue of its actual nature. Thus they invoked the sun for warmth or fertilisation; the moon, to dissipate the darkness; the spring, to slake or inflict thirst; the cloud, to drop its waters or to drift away; the wind, not to blow down the hut; the tree, to bear abundant fruit; ferocious beasts, to spare the life and property of the suppliant. But one day it was observed that the clouds before breaking gathered round a certain mountain. It was, then, the mountain that made the rain. At the moment of full moon the savage would fall ill; it was the full moon, then, which had sent the disease, and which could therefore take it away. As he started out on a successful hunting expedition he met a serpent; serpents, then, had the power of securing game; and if they could bring success in the chase, why not in war and other enterprises as well?"[1]

It would be tedious to trace all the indirect methods by which divine attributes, once conceived,

[1] Count D'Alviella, *Hibbert Lectures*, 1891, p. 74.

would be extended and ascribed. When a priesthood was established, — a necessary outcome of the progressive differentiation of functions, — a special sanctity would attach to the sacred person, to the rites he performed, to the objects he had touched, to the formulas he had uttered. At his death he would be ripe for sharing in divine honours. His descendants would claim a divine origin and hence a divine destiny. Charms and amulets made sacred by the magical touch would be supposed to have a supernatural potency, verbal formulas derived from this source would seem to possess an occult influence, and thus the whole brood of household fetishes and mystic mummeries would find a natural generation.

The Twilight of the Gods.

In the lowest races of mankind we have a perpetuation of these fanciful and incongruous manifestations of the religious sentiment. These races have not in all the centuries of human history risen above these dreams of their intellectual infancy. It would not be difficult, however, to trace the persistence of these phantasies among the most highly civilised races of to-day, for they are constantly breaking out as survivals even upon a high plane of culture. But the general progress of mind has slowly effaced these

vagaries from the thoughts of the more developed peoples. It is a necessity of expanding reason that it should dominate more and more over the work of imagination.

There were two paths leading from the early polydemonism and polytheism to the monotheistic conception, — the ethical and the speculative. A tribal deity became national, and hence a "king of kings and lord of lords." From being at first only supreme over other gods, he became at last the one and only god, jealous of his authority and visiting his wrath upon all apostates. "Thou shalt have no other gods before me," was the first precept of Hebrew monotheism, not understood at first as a denial of the hereditary polytheistic faith, but merely as an exclusive claim to worship and obedience. In the case of the Hebrews, the supremacy of the national deity was supported by the co-operation of the practical reason, for he was conceived of as supremely ethical. The tendency of the Hebrew people to lapse into polytheism and idolatry was met and overcome, partly by patriotic motives, but also by the strongest moral considerations. The Hebrew prophets saw in their deity "a power that makes for righteousness," as Matthew Arnold has expressed it. Among them God was conceived of as an indwelling presence of whom every conscience

bore witness, rather than as a mighty artificer whose being was evinced by the technic wonders of his art. Thus by slow degrees thought was directed inward, to the evidences of the divine in man himself and in the ordered life of man. Theirs was an ethical, not a speculative, theism. They hardly had a theology, for this is but a form of philosophy. The divine was disclosed to them in the unity of the moral consciousness, and they found God by the way of obedience, not by the way of thought.

It was reserved for the Greeks to arrive at monotheism as a purely rational conception. As early as the sixth century before our era, reflection had so far destroyed faith in the gods among the more thoughtful Greeks that nature came to be independently regarded. The transition from the mythological to the scientific interpretation of nature is found in Thales of Miletus. As Grote suggests, the question, *Who* sends rain, thunder, and earthquakes? had become, What are the *natural conditions* of these phenomena? The mind naturally followed upon the lines of the ancient myths, but with a new interpretation. Homer had made Oceanus the first parent of all. Thales strips the ocean of personality, and affirms that "water" is the original substance, the primary cause of everything; and natural reasons may have been found either in the fact that moisture

is essential to animal and vegetable life, or in the ready transmutation of water into the three forms of matter, — solid, liquid, and gaseous. Such speculations once started, Anaximander found the original substance, or ἀρχή, not in water, but in "undifferentiated matter," the "unlimited," or "infinite," — related to the primeval Chaos of Hesiod as "water" was to the Homeric Oceanus. Anaximenes found this primary element in "air," and Heraclitus in "fire," marking a total departure from the mythic basis of thought, and seeking the ἀρχή directly in objective nature. But with this new step a still greater transition was made, for Heraclitus uses "fire" only as the outward seeming or visible symbol of an invisible principle of ordered change and universal law. As thought advances, the external appearances of things are less and less satisfactory to reflective intelligence. Pythagoras discerns the ultimate principle of things in "number," or harmonious form. With Xenophanes, anthropomorphism and polytheism are bitterly denounced, and the unity of the world is boldly maintained, while Parmenides idealises the ancient theogony, and Empedocles anthropomorthises the elements of matter. Then appeared Anaxagoras (500 B.C.), — whom Aristotle likens to a sober man rising among drunkards, — affirming that νοῦς, or "rational mind," is the soul

of the world and the cause of its order, dwelling in all plants and animals. Democritus reverts to the hypothesis of purely material "atoms"; then follow the sceptical dialectics of the Sophists, and Socrates, — though called an "atheist" because he rejected the popular polytheism, — establishes the philosophical monotheism amplified and taught by Plato and Aristotle. Although Aristotle came nearer than Plato to the conception of a divine immanence in the world, it is true, as Zeller points out, that "Greek philosophy finally results in a dualism which it finds impossible to overcome scientifically. . . . Plato opposes to the empirical world an ideal world, but is unable to find in this ideal world any explanation of the other; he can only explain matter as something non-existent. . . . Even Aristotle keeps pure spirit entirely distinct from the world, and thinks that man's reason is infused into him from without. . . . In the philosophy of the Middle Ages, spirit asserts itself as alien and opposed to nature." [1]

It has been the effort of Christian theology, inheriting an ethical theism from the Hebrews and a speculative theism from the Greeks, to reconcile and unify these two ideas. Starting with a pagan sense of the necessity of proving the existence of God, which no Hebrew ever felt, appeal was

[1] Edouard Zeller, *Pre-Socratic Philosophy*, vol. i, pp. 161, 162.

made to the teleological conceptions of Plato and Cicero, and all was made to depend upon the evidences of a divine artisan in nature. Matter was conceived of as essentially amorphous and inert, and the operation of a spiritual artisan was sought in the evidences of "design" in nature. The world was regarded as a great machine, whose structure evinced an artificer. Great stress was placed upon the necessity of "interference" from without, and every token of such intervention was regarded as an apologetic trophy. "Every design must have a designer," wrote Paley. But Kant pointed out that it is illegitimate to infer from adaptations more than is necessary to account for them, and Darwin has shown that the most complicated organic structures may arise under the operation of natural law. Hence the alleged collapse of the teleological argument and of natural theology. Biological and psychological science unite in affirming that every event, organic or psychic, is to be explained in the terms of its immediate antecedents, and that it can be so explained. There is, therefore, no necessity, there is even no room, for interference. If the existence of a deity depends upon the evidence of interventions and supernatural agency, faith in the divine seems destined to be destroyed in the scientific mind.

The "Unknown God."

Upon the assumption of dualism, whatever tends to show the sufficiency of nature tends also to show the absence of the divine from the world. When primitive religion failed to see God in the ordinary, the intelligible, and the natural, and sought him only in the unusual, the mysterious, and the supernatural, it needed only a sufficiently long process of reflective thought to banish mythology from the minds of men. When Greek philosophy invoked the divine for purely speculative purposes, to help thought out of its extremities, and failed to find it resident in the constitution and nature of the world, it laid the foundation for modern atheism and agnosticism. If God is needed only in emergencies, he is not likely to be found at all. A Christian apostle taught a quite different doctrine, full of the Hebrew sense of the divine immanence, when he spoke to the speculative Athenians of the "Unknown God," in whom "we live and move and have our being." His being and nature are attested in our own, for we are "his offspring." The divine is to be sought in the universal, not in the exceptional; in the constitution of things, not in interferences with them. There is, no doubt, much that wholly transcends our

intelligence, but we can approach the divine only through what is accessible to the human. Faith rests upon what is known, not upon the unknown, least of all upon the "unknowable." The order and progress of the world, the ideals which press upon us for realisation, — these are the secure foundations of religious faith. The trust that the Author of our being will not put us to "permanent intellectual confusion" is the basis of our science. The trust that he will not put us to permanent moral confusion is the foundation of religion. Its growth is nothing else than the enlarged faith of the human in the divine, "if haply we might feel after him and find him, though he be not far from every one of us." The unity of the world, the immanent rationality of its processes, the beneficence of law, the imperative authority of duty, — these are the corner-stones of religious life and hope. It is the attestation of these realities given in the Hebrew and Christian Scriptures that imparts to these writings their wonderful power over the lives and thoughts of men. The noblest fruits of religion spring from the consciousness of the divine in human life, and whatever more fully discloses this is "revelation."

And what has the history of thought to offer in confirmation of this truth? Professor Weber, of

Strasburg, concludes his survey of European philosophy with this summary of its results: "Modern science has resolved the idea of 'matter' into that of 'force,' and Leibnitz has well said, 'There is no substance without effort.' But to put forth effort, is *to will*. If effort is the essence of matter, it is 'will' which is the source, the substance, and the generative cause of matter. On the other hand, effort is also the source of perception, for there is no perception without attention, no attention without effort. It is then, finally, 'will' which is the superior unity and the first cause of what we call 'matter' and what we call 'mind.' 'Will' is being in its plentitude; everything else is only phenomenon. Separated from the effort which produces them, realises them, constitutes them, both 'matter' and 'thought' are only abstractions. Both exist only through 'will.'"[1] Such is the conclusion of modern philosophy.

There is, then, between the animism of primitive man and the results of modern thought this bond of union: both explain natural phenomena in the same terms, those of "will"; for this alone represents equally the two modes of phenomenal manifestation, efficient energy and intelligent direction. As Count

[1] Alfred Weber, *Histoire de la Philosophie Européen*, pp. 553, 554.

D'Alviella has said: "The philosophy which, resting on the most recent discoveries, has established the constancy of the same energy under all the varied manifestations of nature, can only conceive of that ultimate force by relating it to our sense of effort, springing from the consciousness of the resistance of our surroundings to the action of our will."[1] The sentiment of dependence, out of which religion primarily sprang, is still existent within us, reinforced by the larger trust which wide experience has given. Religion will, therefore, continue to be a characteristic human attribute, but with a new sense of the divine within us as constituting the very substance of the world, and with a firm conviction that we are ever in the presence of immanent Reason acting under the formulas of beneficient law.

[1] Count D'Alviella, *Hibbert Lectures*, 1891, p. 52.

X.

THE GENESIS OF SCIENCE.

It is, perhaps, unfortunate that the word "science" is simply the Latin word for "knowledge." It leads too easily to the erroneous inference that all knowledge is science, and that there is no test or standard of truth higher than the faith of the individual in the reality of his own thought. Knowledge is older than man, for it is possessed by the whole animal world; science is the product of slow development, a late acquisition in the life of humanity. The dog knows the presence of the bird and the rabbit as well as his master, but he does not know the position of these objects in the series of organic forms. He knows that a man is not a tree, but he knows nothing about anthropology or botany. Knowledge is the perception of a fact in an individual consciousness; but science is the apprehension of this fact in its relation to other facts, its subordination to universal laws, and its correlation with its ante-

cedents and consequents, as established by the "consensus of the competent." Science is knowledge in its relations, verified and organised, and considered as a part of a great body of demonstrated truth. Every man may acquire knowledge, but no man has ever alone and independently constructed a science. Knowledge is a personal possession; science is an impersonal product of social activity. As has been well said: "The scientific man, when he has made a real discovery, and verified it carefully and conscientiously, knows well that verification for himself is by no means verification for mankind. Convinced as he may be of the truth of his new observation, he nevertheless knows well that it cannot be declared or treated as a part of universal human knowledge. The new discovery must be flung into the arena of the world, and battle for its life among the wild beasts of ignorance, indifference, incredulity, prejudice, jealousy, envy, hatred, malice, and all uncharitableness. Before the new truth, no matter how well verified to the discoverer's own mind, can become verified to the world's mind, it must run the gauntlet of universal criticism; it must be doubted, denied, assailed, maligned, and hustled about unmercifully; it must be subjected to fresh verification by every trained investigator who suspects that it may be, indeed, a truth; it must thereby

conquer here and there a new adherent, and prove itself to be a truth, indeed, by conquering at last the adhesion of all who are competent to be its judge."[1]

The Pre-conditions of Science.

It is evident that a process like this, by which science is produced, cannot occur without numerous preliminaries. There must be self-consciousness, power of abstraction, language as a medium of discussion and record, capacity to invent hypotheses, instruments of investigation, an accumulation of facts, means of verification, and the grasp of some general principles, before science can even begin. To the animal, however intelligent, all these are impossible. Even to man they are equally unattainable until he has advanced considerably in the course of development both intellectually and socially. Art must be old before science can be born, for science is the child of art. Thought must rise above the level of mere bodily or emotional impulses before a scientific motive can exist. The liberally endowed individual must not only be lifted above immediate needs, emancipated from the thrall of inferior pleasures, and stimulated to profound reflection, but he must enjoy a social condition of relative liberty and toleration,

[1] F. E. Abbott, Lecture before the Brooklyn Ethical Association.

before science can be the end of his activity. Generations of such men must exist before the results of scientific labour can reach any great height of inspiration or even of attraction. At first, therefore, knowledge cannot be a self-sufficient end, but is simply a means, the necessary path to the accomplishment of a utilitarian, or at most a decorative, purpose. The first knowledge that can bear the qualification of "scientific" may, therefore, be expected to arise in connection with some useful or ornamental art. But the arts are practised by only a few, and the knowledge sought is that directly related to a single handicraft or vocation. What will suffice for a relative superiority is all that is desired. In the meantime, institutions — social, civil, and religious — have become established, springing out of the most elementary human needs, and resting in part upon early misconceptions and errors, to which new truth seems hostile, and which are, therefore, barriers to the progress of knowledge suspected of being antagonistic to their usages and pretensions. Authority, the prestige of a sacred past, lifts its voice of opposition, of criticism, of warning, even of prohibition, against innovation. Only the hero can make head against the stream of conservatism, and thus science is still further retarded by social obstruction.

In the entire range of human history we find no

trace of truly scientific interest combined with polytheistic conceptions. Before science is possible, polytheism must either fall into decay, or ripen into monotheism by the subordination of all the gods to the supremacy of one. When nature is conceived as replete with personal beings who cause its phenomena in an arbitrary manner, there is no interest in the discovery of natural causes. It is useless to know them, if they are liable to the perpetual interference of demons and divinities. But when monotheism appears, while every event is still ascribed to an ultimate divine causation and control, the question arises, What are the *methods* of divine action? When these methods are found to be uniform, the interest of inquiry turns upon the conditions and laws of phenomenal sequence. But even then there may be serious impediments to scientific progress. The ancient Hebrews attained to monotheism without developing science, because the religious institutions of that people so absorbed their energies as to preclude scientific investigation. The dominant duty was to obey, not to inquire; and a minute ethical cult extended to the smallest activities of daily life, leaving neither time nor desire to study nature. The oriental mind, in general, was too much impressed with a sense of the divine predetermination of events to attempt the modification

of natural action. There was, therefore, little impulse toward scientific discovery, except as related to the arts; and these were sometimes proscribed as bordering upon impiety.

The Transition from Art to Science.

It is evident that the transition from art to science was mediated through calculation, and that science really owes its birth to the development of mathematics. The science of numbers and forms — arithmetic and geometry — is at first mere enumeration and measurement, a purely utilitarian art. Its scientific character is acquired in the progress of thought from the mere facts of perception to the universal truth of numerical and spatial relations. This was, probably, the first form of general truth apprehended by the human mind, and it is to this standard of mathematical certainty — that is, of exact expression and prediction — that all science aims to approximate. Without mathematics as an organon of investigation and of verification, no exact science is possible. It may, therefore, be regarded as essential to the transition from art to science.

It is not difficult to trace the beginnings of enumeration and measurement, for the marks of their origin are deeply impressed upon language

itself. The deaf-and-dumb lad, Massieu, wrote: "I knew the numbers before my instruction; my fingers had taught me them." There can be no doubt that the decimal system owes its existence to the number of digits on the two hands. The languages of the lower races have not outgrown the definite reminiscence of this origin. When the Zulu wishes to say "six," he uses a word meaning "taking-the-thumb," that is, having counted the five fingers of one hand, the next number is called "taking-the-thumb," because the enumeration now passes from the first hand to the thumb of the second hand. When he comes to "seven," his name for it is "he-pointed," that is, the finger next counted is the pointing or index finger following the thumb. Among the Tamanacs of the Orinoco, "five" is called "whole-hand"; "six," "one-of-the-other-hand"; "eleven," "one-to-the-foot"; "sixteen," "one-to-the-other-foot," etc. Finally, "twenty" is called "one-man"; "forty," "two-men"; "sixty," "three-men." In the majority of languages, the numerals have lost this express bodily reference, the primary names for numbers having been retained for the purpose of enumeration only, the other meaning having been lost. There are, besides the decimal system, a quinary system and a vigesimal system, — or count-

ing by fives and twenties, — the former among the negroes of Senegal, and the latter illustrated in English when we use "four-score" for "eighty," and in French when they call this number "quatre-vingt." But the decimal system is almost universal, and even these others are modifications of it.

When early man could count and name a sum of units, the next step would be to fix upon various units of measurement, — linear, solid, etc. The common English names show that these units were chiefly found in members of the human body. The "hand," the "foot," the "ell," the "nail," the "fathom," — the compass of the outstretched arms, — the "pace," — Latin *passus*, — and the "mile," — Latin *millia passuum*, or thousand paces, — are examples of the real origin of those units of measurement by which man compares natural objects with himself, and which he extends even to the magnitudes and distances of the stars of heaven.

The linear unit renders easy the measurement of surfaces and then of solids, and the application of its results leads to "geometry." This is the Greek word for "land-measuring," and there is probably truth in the story that this art was invented in order to restore the lines of division among property-holders, obliterated by the overflow

of the Nile in Egypt. An ancient papyrus shows that this art was roughly understood a thousand years before the time of Euclid.

In Egypt there was a high development of constructive and decorative art, and, as auxiliary to this, of natural knowledge; but both art and science were the possession of a priestly class, and carefully concealed from the people. Science was confined to such practical ends as the calculation of times and seasons by means of the heavenly bodies, the surveying of land, and the construction of great monuments for the gratification of royal pride. Hence, Egyptian science was wanting in the exoteric and social qualities which are essential to general progress, and was limited to the cultivation of astronomy, geometry, and mechanics. The pyramids and other monuments of ancient Egypt are often cited as evidences of the great scientific achievements of the Egyptian priests, to whom imagination has attributed an almost universal knowledge; but the extent to which the constructive and decorative arts may be developed with but little of the truly scientific spirit, is shown in the wonderful cathedral architecture of mediæval Europe, which was the product of a time when science, in its modern sense, was at an almost barbaric level.

Greek Science.

Greek science, augmented by the importation of Egyptian ideas, began with the investigations of Thales, about 600 B.C. Pythagoras, also, — the first to be called a "philosopher," and the first to speak of a "cosmos," — soon afterward made many discoveries in the sphere of natural knowledge; but up to the time of Aristotle, speculation prevailed over observation. This great genius was the first to employ a really scientific method upon an extended scale, tracing relationships between plants and animals, and marking divisions of the animal kingdom which are still recognised as valid. Aristarchus, in the third century B.C., was the first Greek who understood that day and night are caused by the turning of the earth upon its axis; but his discovery was discredited and waited two thousand years for the confirmation given by Copernicus, who established this truth against the general opposition of mankind.

The greatest triumphs of the scientific thought of Greece were realised upon a foreign soil, at Alexandria in Egypt, under the Ptolemies. They were, perhaps, inspired by the Egyptian knowledge which the Greeks more completely acquired after the conquest of Egypt, by Alexander. Here were

founded the great Alexandrian Library and Museum. In the royal collections there are said to have been seven hundred thousand volumes. The Museum was provided with a large staff of investigators and lecturers, sustained at the expense of the king, and organised into four faculties, — those of literature, mathematics, astronomy, and medicine. Here were a botanical and a zoölogical garden, for facilitating the study of plants and animals. Here also were an astronomical observatory, supplied with many instruments of precision, and a chemical laboratory. In spite of Egyptian prejudices, there was an anatomical room for the dissection of the dead, and even of living criminals. Men of a truly scientific spirit thronged this greatest school of antiquity. Here Euclid wrote his "Geometry" and "Conic Sections," and, perhaps, a work on "Optics." Here Eratosthenes determined the interval between the tropics, and attempted to calculate the size of the earth. Here Apollonius composed his treatise on "Maxima and Minima," and discussed the properties of the ellipse and hyperbola. Here Hipparchus discovered the procession of the equinoxes, elaborated his theory of epicycles and eccentrics, and made a catalogue of more than a thousand stars. Here also Ctesibius is said to have invented a fire-engine, which his pupil, Hero, improved by giving it two cylinders,

and later surpassed by constructing a steam-engine. Here water-clocks were invented, measuring time by falling drops. Here, finally, laboured the great Archimedes, who later went to Sicily, the founder of hydrostatic science, the measurer of specific gravities, the discoverer of the theory of the lever and the screw, and a mathematician of world-long fame.

Such was the brilliant dawn of science among the Greeks, to be suddenly followed by the total extinction of the scientific spirit. The loss of Greek liberty, the rise of Roman imperialism, the influx of oriental mysticism, and the inundation of barbarism, combined to sweep away every trace of independent inquiry and to submerge Europe in a long night of superstition and intellectual decay.

The Degeneration of Greek Thought.

Greek culture, both on Grecian and Egyptian soil, had arisen as the product of a rare combination of intellectual and social factors. A wonderful capacity for abstract thought and an unexampled atmosphere of civic freedom had rendered the Greek ripe for philosophy. His maturest perception of the direction in which truth was to be sought, after three centuries of speculation, led him to observation and experiment.

But the little company of scientific Greeks stood between two impending whirlwinds of desolation, destined to extinguish the flame of natural inquiry that had just begun to illuminate the world. On the West, the political ambition of Rome, dominated solely by the militant spirit, and greedy for universal empire, was advancing to the conquest of the world. On the East, oriental theosophy, the refuge of idle minds oppressed with the life of the senses and steeped in the narcotic visions of dreamland, was sweeping westward. Toward the close of the second century B.C., Greece became a part of the Roman Empire. From that event until the eighth century of our era, when science was temporarily revived by the Arabian conquerors, there is hardly a notable scientific discovery, and only three or four names appear in the history of science, — those of Ptolemy Claudius, the founder of the Ptolemaic system of astronomy; Strabo, the geographer; Galen, the physician; and the Roman naturalist, the elder Pliny. It is true that Greece became the teacher of Rome, but the demands of the pupil were fatal to the progress of the tutor, and the Roman utilitarianism swallowed up all scientific independence. The conflicts of the various schools led to general scepticism, which rendered easy the conquest of the mysticism of the orient.

This made its appearance at Alexandria with the arrival of eastern ascetics at least a hundred and fifty years before our era. Disregard of the body, mysticism of thought, a dream-like interfusion of religious and philosophic ideas, — combined to produce an anti-scientific disposition. The troubled state of the political world and the precariousness of personal fortune, on the one hand, and an aspiration after an occult knowledge of the invisible world, on the other, rendered science impossible. The characteristics of the time are well expressed in the teachings of Philo, who, beginning with Jewish monotheism, assumed the existence of countless intermediaries, or "powers," such as angels, souls, and demons, between the deity and the sensible world. All these powers are comprehended in the "logos," — the wisdom and reason of God. By the meditation of the "logos," the world was formed out of the chaotic mixture of matter. The body is the grave of the soul. Science, in its objective sense, only thwarts the soul's aspirations. We escape it and rise to true purification only when we become reabsorbed in God and attain a condition of personal unconsciousness. This is approached through contemplation, which results in ecstasy. We are then flooded with divine illumination.

The fusion of this oriental doctrine with the

Platonic philosophy, with which it was easily assimilated, resulted in Neo-Platonism as represented by Plotinus and his followers. With him the deity is evaporated into nonentity, an empty unity without properties, above all being and thought. With such an inheritance as this, still further mystified by the metaphysical vagaries of Jamblichus, who tried to blend with it the ancient nature-myths, Porphyry marks the transition to a rehabilitation of polytheistic religion and mystical philosophy. It was reserved for Proclus to reduce Neo-Platonism to a self-consistent dialect, a form in which it was transmitted to Christianity and Mohammedanism as the philosophy of the Middle Ages. "The works of Proclus," says Harnack, "as the last testament of Hellenism to the church of the Middle Ages, exerted an incalculable influence on the next thousand years. They not only formed one of the bridges by which the mediæval thinkers got back to Plato and Aristotle; they determined the scientific method of thirty generations, and partly created and partly nourished the Christian mysticism of the Middle Ages, both in the East and in the West."[1] Speaking of the results that followed the general triumph of Christianity as an authorised religion, Harnack continues: "The church and church theology, to whose guidance the

[1] *Encyclopedia Britannica*, article "Neo-Platonism."

masses now surrendered themselves, took in along with them their superstition, their polytheism, their magic, their myths, and all the machinery of religious witchcraft." The pure doctrines of ethical Christianity, as taught by Christ and his apostles, were completely submerged by the deluge of heathen ignorance and polytheistic faith. The name "Christian" was transferred to the curious mixture of superstition and authority which distinguishes the period of the "Dark Ages."

The Reign of Ecclesiasticism.

Until the modern revival, philosophy existed in Europe henceforth only as the "*ancilla ecclesiæ*," the servant of the church. The works of the pseudo-Dionysius converted the church theology into a scholastic mysticism based on Neo-Platonism, and as these writings were attributed to Dionysius, the disciple of the apostles, this teaching was regarded as an apostolic, which was held as the equivalent of a divine, science. Harnack goes so far as to say "that the mystical and pietistic devotion of our own day, even in the Protestant churches, is nourished on works whose ancestry can be traced, through a series of intermediate links, to the writings of the pseudo-Areopagite." Augustine, the most influen-

tial theologian in the church, is the one who, by his own acknowledgment, owes most to Neo-Platonism.

The political establishment of Christianity, the universal dominion of Rome, the formation of ecumenical creeds, the rise of the papacy, the triumph of scholasticism, — combined to prevent the resuscitation of science. The one end of life was the "salvation of the soul," a Neo-Platonic expression for the emancipation of the spiritual nature from its material investiture. To accomplish this liberation, interest was withdrawn as much as possible from outward things and concentrated upon the vision of the cross and other hypnotic objects. Fasting and prayer were found to be useful preliminaries to the trance and ecstasy of the spiritual life. There was neither motive nor opportunity for investigation or research. Everything was determined by authority; inquiry was considered as profane, and dogma was triumphant. The barbaric peoples, who either flung themselves upon the centres of ancient civilisation or were subjected by conquest, retained their hereditary belief in demons and witches, and magic ruled the mind. Nothing but the pure tradition of evangelical morality in the hearts of the people, as embodied in Christian love and its fruits of charity and gentleness, prevented the primitive barbarism of these nations from completely overwhelming

human life. The Sacred Scriptures were proscribed to the masses, pagan rites and customs were grafted into the new faith, and, in the name of the gospel of peace, perpetual wars and fanatical crusades exhausted the energies of men. The only indications of a scientific spirit were shown by the Arabs in Spain, in the eighth century, and these, by contrast, have been much exaggerated; for the whole spirit of Mohammedanism is traditional and narrow, according the finality of all important truth to a single man, the fanatical founder of the sect.

Among the Arabs who cultivated scientific inquiry, the interest in medicine was very intense, and their alchemists sought especially for some "elixir of life" which would impart immortality. It was believed also that it was possible to discover the secret of transmuting the base metals into gold. From such pursuits, blended with a faith in demons who could reveal these secrets, arose the noble science of chemistry. All these investigations were intimately connected with a belief in the influence of the stars upon human and mundane actions. Astrology and alchemy, therefore, were closely blended. Roger Bacon became interested in these occult arts, but brought to their study a mind of superior order. In him we find the first historic intimation of the revival of the lost science of the Greeks among the natives of Christian Europe.

The Scientific Renaissance.

Unconsciously to itself, the church was nourishing in its bosom a power that was to destroy its pretensions to infallibility. The thought of man was, indeed, directed mainly to another world and its problems, but the system of discipline which was necessary for effective ecclesiastical control and leadership became a school of intellectual acuteness and vigour that could not fail in time to affect profoundly the problems of this world. The power of dialectic, cultivated for apologetic uses, was at length turned upon purely human and natural objects. The first practical effect of the new thought was, however, to display the inconsistencies and inconsequences of ecclesiastical pretensions and their barrenness of moral fruits. The conscience of Europe became aroused, and a great moral and religious revolution occurred, — the Protestant Reformation of the sixteenth century. The discovery of America, the invention of printing, the bold generalisations of Tycho Brahe, the heliocentric theory of Copernicus, the sublime demonstrations of Kepler, the visible proofs that the earth is but a planet, given by the telescope in the hands of Galileo, — all were so many mighty thrills of life to thought, transforming the conceptions of the

human mind and its possibilities. The degradation into which the thought of Europe had fallen, or in which it was deemed politic that it should be kept, is shown by the resentment and condemnation which these marvellous discoveries evoked. But the tide of the new knowledge came in like a flood. Francis Bacon pointed out that the philosophy which men needed was one of "fruitfulness," and not one of barren finalities. Newton completed the new cosmology by his theory of gravitation, Viète showed the relation between algebra and geometry, Napier invented logarithms, Vesalius recreated human anatomy, Fabricius demonstrated the valves of the veins, and Harvey discovered the circulation of the blood. The new science at once opened the infinitude of space and lifted human faith to realities before which its own noblest dreams shrivelled into nonentity, and substituted for the transcendent spiritualism of the Middle Ages the modern conception of an immanent divine agency in the world.

Science and Philosophy.

It is no part of the present purpose to trace, even in brief outline, the history of scientific discovery. The design is simply to show the relation of what is called "science" to the development and

progress of human thought. It is not identical with "philosophy," which may be and usually is individual and personal, but it *is* philosophy socialised, rendered objective, exoteric, and public, and seeking truth by organised methods of inquiry. All science is a part of philosophy in its highest sense. Philosophy has discovered that truth cannot be manufactured or "intuited" in seclusion from the world of reality. Therefore "logic" has been parcelled out into a great variety of "logics," or "-ologies," and thousands of special experts have undertaken the task of exploring nature and making their reports. But the name "philosopher" has been left to the solitary thinker who attempts as an individual to solve the central problems of knowing and being. Still, while a Fichte may try to evolve the universe from the "ego," and a Hegel to reach finalities by an "immanent dialectic," few philosophers have ventured wholly to ignore the results of the scientific movement. But these results have seemed open to more than one interpretation. Descartes, with a wide acquaintance with the science of his time, reaffirmed the ancient dualism, placing "matter" upon one side and "mind" upon the other. He even went so far as to deny mind, and even sensibility, altogether to animals, describing them as "automata," or machines without feeling. His

motive was the desire to vindicate for the ethical and religious life a secure place in the midst of the phenomena of the material world, and at the same time to create a general interest in the natural knowledge which science was obtaining. Cartesianism became the refuge of apparently antagonistic tendencies, — that of the traditional spiritual faith on the one side, and that of the new science on the other. Its success as a temporary compromise was considerable, but reaction against it was inevitable. In defining two opposite and wholly independent spheres of existence, — the spiritual, which had no relation whatever to space, and the material, which was space-occupying and objective only, — he prepared the way for a bitter conflict and for perpetual encroachments and reprisals from both sides. It was impossible for human interests to be permanently separated by a purely imaginary line. The advocates of the spiritual elements in human faith and hope naturally claimed the whole field and proclaimed the dogmas of idealism. The students of the object-world, however, saw all phenomena under the guise of material combinations, and proclaimed the dogmas of materialism. The history of modern philosophy is chiefly the record of the struggle between the partisans of these two extreme views, diversified

only by the presence of stalwart dualists who have preserved an armed neutrality, insisting that both contestants are partly in the right but mainly in the wrong, because they have failed to recognise the great and impassable "chasm" fixed between mind and matter.

Spinoza saw the impossibility of holding apart the two sides of human experience, — that which he calls "thought" and that which he calls "extension," — as having no real unity. But his method of proof of their unity, rigidly geometrical in form but wholly *a priori* in substance, while convincing as a merely logical performance, had the serious defect of seeming to start with merely dogmatic assumptions. The dire mechanical consequences which seemed to follow from such a method were also repellant to the mind, which appeared to be at once more complex and more spontaneous than his analysis admitted. The protest of the moral consciousness, asserting its own certainty of freedom, was too strong to be overcome by a mere structure of speculative thought, however imposing and symmetrical and however unassailable by logic. Dualism, rejecting Spinoza's pantheism, has still kept faithful watch over the "chasm" through which alone it saw an avenue for the entrance of the divine into the soul of the sinner, on the one hand,

and the material machine, on the other. It left at least an "opening" which imagination could fill in. But, strong in the sense of ultimate unity as the very essence of reason, idealism has etherialised the object-world and resolved it into mere thought, and materialism has denied the spirit-world and resolved all thought and feeling into mechanical motion. In the meantime, science has observed and verified and enlarged the cosmic conception, establishing the uniformity of law, the unity of energy, and the continuity of development.

The Progress of Monism.

The admitted "juxtaposition" of "mind" and "matter" is in the living body; for, while declaring that "the whole diameter of the universe lies between them," even dualism regards "mind" as having some kind of a "*locus*" in the body, and even insists upon a certain interaction between the two. Biology, therefore, is the science which must determine the truth or falsity of this conception. The light thrown upon the problem by Darwin has shown the substantial unity of the whole animal world. The doctrine of the living cell — the universal organic unit — has reduced the problem to much simpler form than could have been supposed possible. The

facts of heredity prove the presence of both physical and psychic properties in these minute structures. Comparative psychology supplements biology and traces the correspondence of the two phases of being throughout the whole animal series. The evidence of the psychic element is finally lost to our outward observation, but the principle of continuity forbids its transition into nothing. It is lost as a manifestation to sense, but not to thought. But so also is "matter" lost to our senses as a manifestation. It baffles us even in the cell, it completely eludes us in the molecule, it vanishes utterly in the atom; but it persists in thought. If we seek in our experience for the unity of both the psychic and the physical elements, we seem to find it in the concrete experience of "will," which is logical and dynamical at the same time, "mind" as conscious direction of energy, "matter" as energy directed and working material changes.

When this real unity of mind and matter is once apprehended, the source of the error of the ancient dualism is apparent. It consists in the abstraction of two concretely coexisting qualities from their real unity and regarding them as if they were separately real. One of these is "consciousness," which is floated off and hypostasised as "mind"; the other is the "objects-of-consciousness," which

are hypostasised as "matter." The illegitimacy of the procedure is evident. We have no knowledge of "consciousness" apart from "objects-of-consciousness"; and, conversely, we have no knowledge of "objects-of-consciousness" apart from "consciousness." But why not call the concrete unity which presents this double appearance "pure spirit"? Because there are modes of experience which cannot be fairly included within this term, which has been used to designate the polar opposite of "mere matter." Then why not say that the unity of being is found in "matter"? Because this is the phenomenal opposite of "mind," and the advocates of "pure spirit" will rightly resent this one-sided identification, this putting of a part in place of the whole. It would be like saying, the essence of a leaf is its "colour," or its "shape," or its "vitality." It is a revival of the old error of seeking the ἀρχή of the world in "water," or "air," or "fire."

Objections to Monism.

But is not the interpretation which finds the true unity of being in "will" deserving of the same criticism? Yes, if "will" is considered as an abstract idea. But while, no doubt, that meaning of the word is not uncommon in philosophy, it is

not the one here intended. What is meant is the concrete experience of energy consciously exercised. In this there is the complete concrete unity of "mind" as percipient and of "matter" as operant. One and the same being at the same time knows and acts. Here, then, is conscious being modifying objects. It is no play of the abstracting faculty which gives us this knowledge, but the focal concentration of our whole being, psychic and physical, upon a single point of apperception. It may be misleading to call this apperceived unity of being "will," or to give it any name. But, in describing it, it is necessary to call it something. It is not apprehended as either "mind" or "matter" in their isolation. It is rather *both* in their concrete unity. As these constitute one man, whose subjective and objective aspects are phenomenally different, so they constitute one universe, whose unity is not the less certain because its manifestations are diverse.

But it may be objected that, since we distinguish voluntary from involuntary actions, and the former are few in number as compared with the latter, it is an error to identify all being with one of its specific modes, especially a mode so limited and exceptional as that of "will." This would be final were it not for the genetic relation which

unites these two kinds of action. It is well known that "life," or more properly "living matter," precedes definite organisation. Accordingly, Professor Cope defines "life" as "energy directed by sensibility, or by a mechanism which has originated under the direction of sensibility." In the course of development of a living organism, reflex and automatic actions of great complexity are evolved, originating in sensible movements, but ending as merely mechanical processes. Thus, structure in living beings is a specialisation of energy which is primarily sensitive and voluntary. This is the process which Professor Cope calls "catagenesis." He extends it to the entire inorganic world. He regards the inorganic elements as specialisations of a primary homogeneous, or generic, energy. This coincides with Herbert Spencer's great induction, that the order of evolution is from the homogeneous to the heterogeneous, from the generic to the specific, from the simple to the complex. But what is more generic than the energy of "will," which is at once causal and conscious?

The purposive acts of a living organism at last become automatic, habitual, involuntary, fixed, and for this reason subject to calculation and prevision. All inorganic processes are so completely automatic as to be subject, when understood, to exact calcu-

lation and prevision. The astronomer can predict an eclipse with infallible certainty, unless there is an error in his own processes. There will be none in the cosmic process. There will be no interference with the predetermined course of nature. Such is the general character of cosmic energies. They are highly specialised. They can act in one way only. They represent *the habits of the universe.*

But were they always thus specialised? The whole history of nature and the law of evolution speak against it. There is a difference between *natura naturata* and *natura naturans*, and the difference is this: nature as a *product* is the cosmic "will" in its stated, fixed, or settled forms, as expressed in the formulas of law; nature as a *process* is the cosmic "will" unfolding new and unattained results in the course of progress, but not without regard for conditions already established. The object-world represents nature in the mode of "will" transformed into the settled order of automatic action; the mind of man opens to our knowledge nature striving after the unattained ideals, continuing the process of specification upon a higher plane.

But it may again be objected that, if the cosmos originated from "will," the ultimate ends toward which that will is directed might have been immediately attained, without the intervention of a long

series of intermediaries. But this is to assume that "will" does not operate through media, but attains its ends directly. This is, however, a contradiction of all our experience, which shows that ends are realised only through progressive transformation. The assumption is, therefore, untenable. It is sometimes inconsiderately asked why evolution should not have attained its results long ago? But this is like asking why being is not other than it is. Our only possible appeal is to the order of reality.

It is evident from what has been said that scientific monism would not interpret all natural actions as special volitions of a cosmic subject, although the universe as a whole is the expression of "will." There is no "divine complicity" in every criminal action, as the doctrine of "occasional causes" of Geulincx and Malebranche required. When the criminal employs natural agents for his purposes, there is no divine "assistance," but merely the appropriation by him of established conditions and relations of cause and effect, as he might take advantage of the habits of a good man to rob or murder him. A cyclone is not a special act of divine vengeance, but merely a combination of natural forces, whose end is not to be sought in the specific consequences, but in the general adaptation of the forces thus combined. Nature is simply the sum of cosmic habits, "will" expressed in the terms of a specific automatism.

Science aims simply to ascertain, by observation and experiment, and by the co-ordination of all acquired facts, what the laws of being are. It would be presumptuous to suppose that these have all been discovered. Science, as a continuous growth, is only three hundred years old; and, therefore, in its infancy. It required that long period for the Greek mind to rise from the search for knowledge in the interpretation of ancient myths to the use of experiment. But modern science has reached some conclusions which are not likely to be modified by increased knowledge, namely: that all energy is essentially one; that it acts in inorganic matter according to fixed laws; that there is continuity, or kinetic equivalence, in all phenomena; that the laws of thought are applicable to the world of things; that there is progressive evolution in the organic world; and that, since man's intelligence is the reflex of the real world, the real world is intelligible to man.

The Present Attitude toward Science.

It is true that science is still suspected and disregarded by a considerable portion of mankind, even in the most civilised countries. This distrust and indifference are, however, easily accounted for. But there is a constantly increasing hospitality shown toward

science, which implies an ultimate acceptance of its conclusions wherever there is enough intelligence to understand them. Lecky has thus described the growth of what may be regarded as at least a predisposition to receive scientific truth: —

"There is certainly no change in the history of the last three hundred years more striking, or suggestive of more curious inquiries, than that which has taken place in the estimate of the miraculous. At present, nearly all educated men receive an account of a miracle taking place in their own day, with an absolute and even derisive incredulity which dispenses with all examination of the evidence. Although they may be entirely unable to give a satisfactory explanation of some phenomena that have taken place, they never on that account dream of ascribing them to supernatural agency, such an hypothesis being, as they believe, altogether beyond the range of reasonable discussion. Yet, a few centuries ago, there was no solution to which the mind of man turned more readily in every perplexity. A miraculous account was then universally accepted as perfectly credible, probable, and ordinary. There was scarcely a village or a church that had not, at some time, been the scene of supernatural interposition. The powers of light and the powers of darkness were regarded as visibly struggling for the mastery. Saintly miracles, super-

natural cures, startling judgments, visions, prophecies, and prodigies of every order, attested the activity of the one, while witchcraft and magic, with all their attendant horrors, were the visible manifestations of the other."[1]

Science and Faith.

The chief existing prejudice against science is the fear that its effect will be to destroy the faith of men in what it is for their good that they should believe. It seems very evident that, if God is simply the sensible world and the soul is the body, the whole interest of man is likely to be concentrated upon the world of sense, and that hope and faith must be confined to its immediate possibilities. There is but little gain, on the other hand, if the reverse aspect be presented, and we say, the world of sense is God and the body is the soul; for, although the soul is thus regarded as resident in God, the conception is merely a natural pantheism. These are, however, the old materialistic and idealistic theories, with which modern science has little sympathy, and to which it gives no support. Scientific monism opens an invisible world of reality transcending the world of phenomena, to which the postulates of Dynamic

[1] W. E. H. Lecky, *History of the Rise and Influence of Rationalism in Europe*, vol. i, pp. 27, 28.

Reason may be extended. Where dualism points to a mere "chasm" between phenomena, to be filled in by faith, or by the "unknowable," or to be left vacant altogether, monism places Dynamic Reason, with all the possibilities of hope and faith grounded upon reality, not left to float in vacancy.

Science is not atheistic. The Supreme Being, as known to science, is both reason and energy, infinite to our understanding, but not altogether "unknowable." The elemental concomitance of the psychic and the physical in being as known to us, indicates the existence of a psychic unity above our own which may be called cosmic; and if this is not personal, it is because it is more than personal, surpassing the limits within which we are accustomed to circumscribe personality as manifested in ourselves.

Science does not destroy the hope of a future life. Whatever moral or other grounds exist for this aspiration, they are supplemented by new possibilities which science alone has revealed. The whole process of psychic evolution is a continuous transfer of function from less to more refined, complicated and specialised organisms. Our most recent science has opened to us the reality of an invisible world. It is certain that an invisible medium affords the bridge over which mental and moral qualities are trans-

mitted by heredity from generation to generation. Who will be so adventurous as to say that the last medium to which psychic action can be transferred, and the only embodiment in which the unity of consciousness can be attained, are the ponderable but unstable compounds that constitute the living brain? It is true, that experience here finds its limit, and before our eager senses the curtain falls. But science has constantly taught, and with increasing certainty, that reality extends beyond the penetration of a finite mind.

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